

User Manual

P7C Controller – HI tecnologia



Presentation

Dear Client,

We would like to thank and congratulate you for the acquisition of HI Tecnologia's new Programmable Logic Controller, model P7C.

The Product:

It was developed in consonance to IEC61131-2 and reinforces our commitment in always offering products with a high technological content and the best relation cost/benefit.

Example of the creativity, competence and quality of the national engineering, this equipment not only satisfies the immediate needs of the automation market, but also offers resources and features reserved for big-sized equipments. Just to exemplify this, we will list the intrinsic features of P7C:

- New processor, faster and provided by more resources (integer arithmetic, floating point, strings manipulation);
- More memory for data and programs;
- Functional design, exclusive and with compact dimensions;
- Multiple communication resources, providing RS232-C¹, RS485¹ and Ethernet¹ 10/100 Mbits¹ serial channels;
- SPDSW/OPPE programming environment, with a big range of programming, debugging, supervising, documentation and local/remote communication resources (for free and available for download at our website);
- Training and technical support direct from the manufacturer;

The Company:

Innovating and contributing for national consolidation since 1989, HI has faced and overcome challenges through the systematical use of strategies, which among others, favor the opinion of clients, the continuous improvement, the complete domain of the technology applied (hardware and software) and the maintenance of a permanent communication channel that considers the market needs.

HI Tecnologia has its Quality System certificated since 2003, according to ISO9001 standard, and re-certificated at ISO9001:2008.

Compromises and Values:

Transparence, quality, respect to the environment, to the legislation, satisfaction of our clients, suppliers and employees, support to institutions which share our ideals: these are some of the principles which lead our actions.

We count on your opinion and suggestions to improve our products. For that, please, send your message to the following addresses: marketing@hitecnologia.com.br and/or suporte@hitecnologia.com.br.

Yours Faithfully,
HI Tecnologia Ind e Com Ltda.
Marketing Department

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Use the information below to make the service easier and faster:

- Manual Reference: PMU.107001

Support Team email address: suporte@hitecnologia.com.br

Website: www.hitecnologia.com.br

Preface

Operation Manual Focus

This manual gathers information about the Programmable Logic Controller P7C, its mechanical design, expansion modules, electrical and mechanical installation procedures, as also its compatibility, functionalities, technical specification, in order to instruct the user about its configuration and handling. Read attentively the instructions of this manual to use it correctly and avoid damages.

Previous required knowledge

Basic notions of controllers programming, electricity and instrumentation.

Related documentation

At our website there are several documents, not only related to this product, but also about its programming, besides additional instructions about its functionality. Check the Application Notes (ENA), Functional Descriptives (PDF) and others.

How to get this manual?

This User Manual is available for free download at our website. Use this link to download it: www.hitecnologia.com.br/download/PMU10700100.pdf

Another way to get it is contacting our Support Team:
Phone +55 (19) 2139-1700 or e-mail suporte@hitecnologia.com.br

Notes and Acronyms

ASCII	Seven bits characters codification, based on the English alphabet, used at computer texts, communication devices and other devices that use texts
Backplane	Electronic module that has as its main function the interconnection of modules
Bits	The smaller standard of measurement for data transmission
CBUS	Communication channel via P7C controller data bus
Connector	The element that allows the connection between signals of two or more devices
AD Converter	Electronic component responsible for the analog signals conversions into the digital format
Data Flash	Memory used essentially to store process configuration and data
Dip Switch	Small switches used at electronic modules
Encoder	Electromechanical device that counts or reproduces electrical pulses, from its axis rotation movement
Ethernet	One of the standards used for information exchange between devices and a communication network
GND	Zero Volts potential in electric circuits
Hot Swap	It is the feature of an electronic module that allows to insert or remove it from the equipment without turning it off
I/O	I – Input and O – Output
Impedance	Opposition measurement of the electric current flow
Jumper	Device used for connecting two points at one electronic module
Loader	Device operation mode that allows a new firmware load
mA	Standard of measurement for electric current (Miliampère)
Modbus	Data communication protocol widely used at industrial automation equipments
Modbus-RTU	RTU Modbus protocol defined to be used in RS232-C / RS422 or RS485 physical layers. The data are transmitted in binary format (eight bits).
Modbus-TCP	Modbus protocol defined to be used in ethernet over TCP/IP transport protocol.
NPN	<i>Type of digital input/output</i>
NV-RAM	N-Non V-Volatile M-Memory – Memory used at electronic equipments and supplied by a battery, so its content can be kept in case of energy lack.
Opto-couple/ Opto-couplers	Connection between two points through optical devices, providing electrical isolation between both
P7C	PLC Model P7C from HI Tecnologia

PLC	P-Programmable L-Logic C-Controller
PNP	Type of digital input/output
PPE	Extended point-to-point - Operation mode of the communication channels that allows the automatic retransmission of communication packages from one channel to the other.
RS232-C	Standard of binary data serial exchange
RS485	Multipoint communication standard for data transference in small quantities and rates up to 10 Mbps.
RTC	R-Real T-Time C-Clock – Electronic component responsible for generating day/time
RD/RX	R-Receive D-Data - Signal available in communication protocols to receive data from another device
SCP-HI	Communication protocol owned by HI Tecnologia
Slot	The space provided at one equipment where electronic modules can be inserted
SPDSW	Programming, documenting and supervising system developed for HI Tecnologia controllers – Windows version
Strap	Device used for interconnecting two points at one electric module connector
Terminal block	A sort of connector used mainly for the interconnection of electrical signals
TX	Transmit Data - Signal available in communication protocols to send data to another device
UDP	Ethernet network protocol without connection establishment
WDT	W-Watch D-Dog T-Timer – Electronic component responsible for reinitializing automatically one device even when it failed

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01

Security Conventions



DANGER

Indicates a highly dangerous situation, that may result in death or serious injuries;



ATTENTION

Indicates a potential dangerous situation that, if not avoided, may result in serious injuries;



CAUTION

Indicates a potential dangerous situation that, if not avoided, may result in small or moderated injuries;



Indicates one danger of electric-shock situation that, if not avoided, may result in small or moderated injuries, fire or death;



Disconnect the device from the energy plug BEFORE executing the following procedures;



Important content: The information presented must be read with attention, because it may impact on the correct operation of the equipment;



Attention when handling liquids over the equipment;
Do not operate the equipment exposed to the weather;



Possibility of damages to the device, if not observed the recommendation indicated;



Components or devices sensitive to magnetic fields;



Components or devices sensitive to electrostatic discharge. Handle it only under appropriate conditions;

02

Product Overview

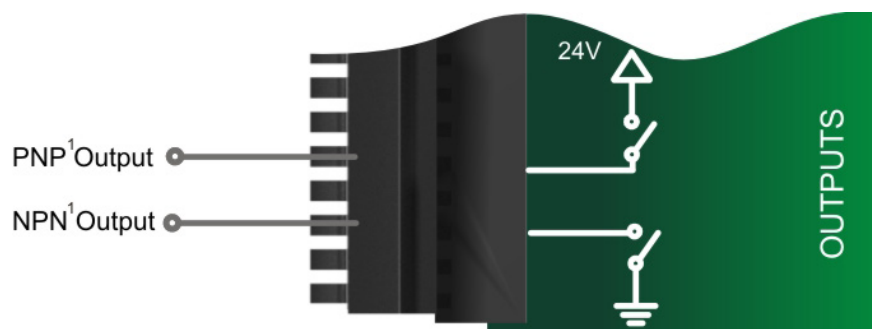
P7C¹ programmable controllers line was developed for attending machine and process control applications. This PLC¹ has up to 368 I/O¹ points at its full configuration and offers all the other HI controllers versatility.

Its design is based on expansible racks. The basic configuration is composed by a main rack with power supply and capacity up to four modules. On the other hand, the *Full* configuration can have up to five expansion racks, providing 24 slots¹ for modules utilisation.

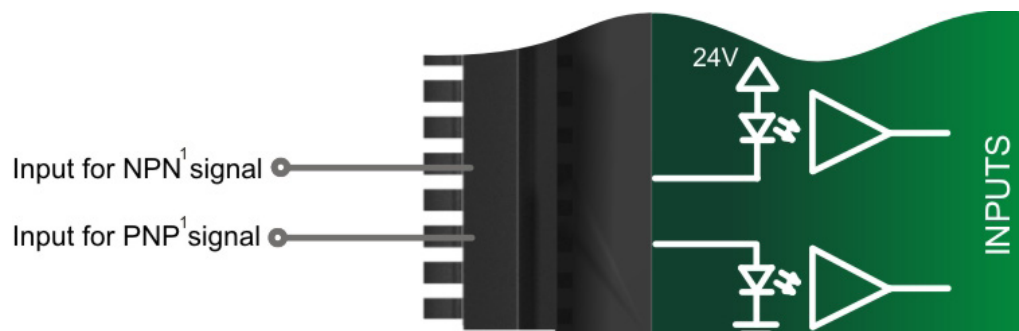
Interface Resources

This topic is only conceptual and presents, just to exemplify, the interface resources available at P7C¹, to acquire configuration information, operation range and others. Check the item "Technical Specification" correspondent to each module.

Inputs/Outputs General Features



IMPORTANT: P7C¹ controller has PNP¹ inputs and outputs.



¹ - Check the Notes and Acronyms List at the beginning of this document

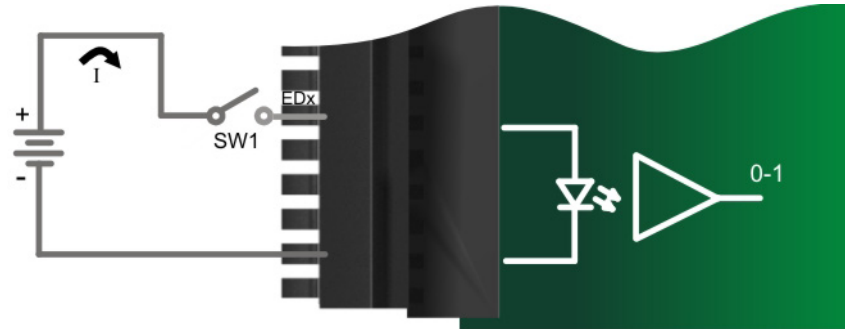
Digital Input

Input for external PNP¹ signals, able to identify two logic levels:

0 - Disabled: when there is no voltage applied at the input.

1 - Enabled: when there is voltage applied at the input.

Application/Use: Contacts and keys reading.



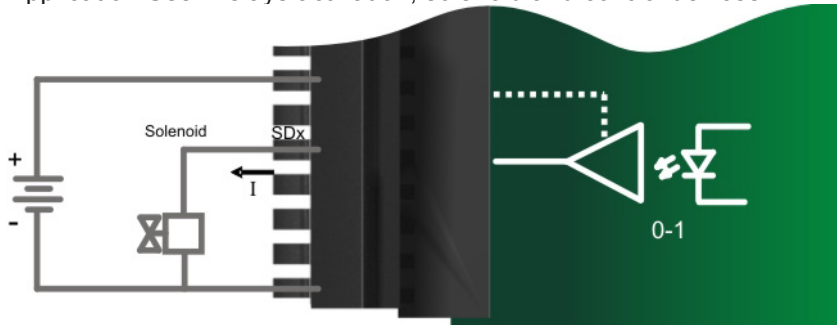
Digital Output

PNP¹ output able to switch two logic levels:

1 - Enabled: keeps the voltage signal at the output.

0 - Disabled: there is no voltage signal at the output.

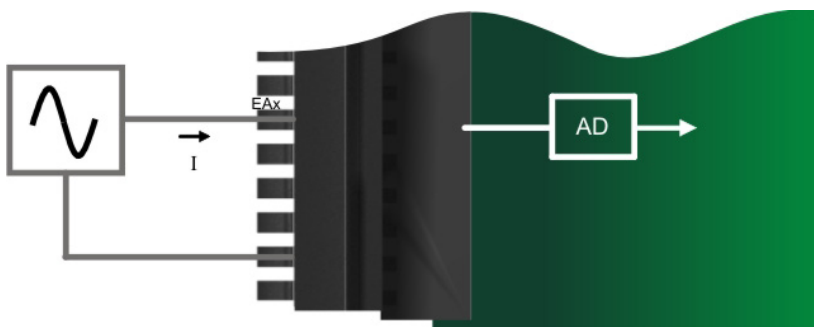
Application/Use: Relays activation, solenoid and control devices.



Analog Input

Input able to read voltage or current signals. The reading precision depends on AD converter¹ resolution, which generally varies from 8 to 16 bits¹. The most common scales are (4 to 20mA¹) and (0 to 5V)

Application/Use: Analog sensors reading (Pressure, Temperature and etc).



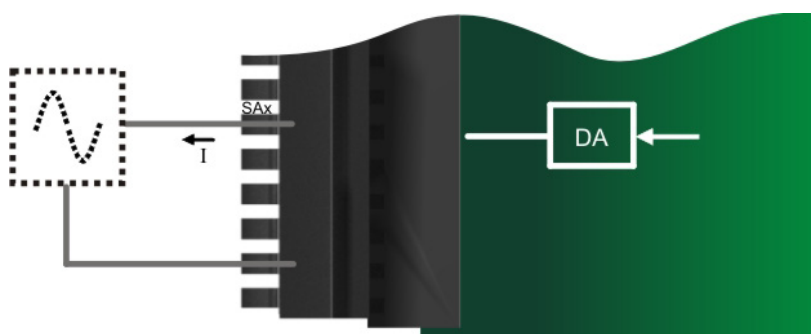
¹ - Check the Notes and Acronyms List at the beginning of this document

Analog Output

It is able to generate current or voltage signals for external process control, being the precision determined by one AD converter¹ resolution.

The most common scales are (4 to 20mA¹) and (0 to 5V)

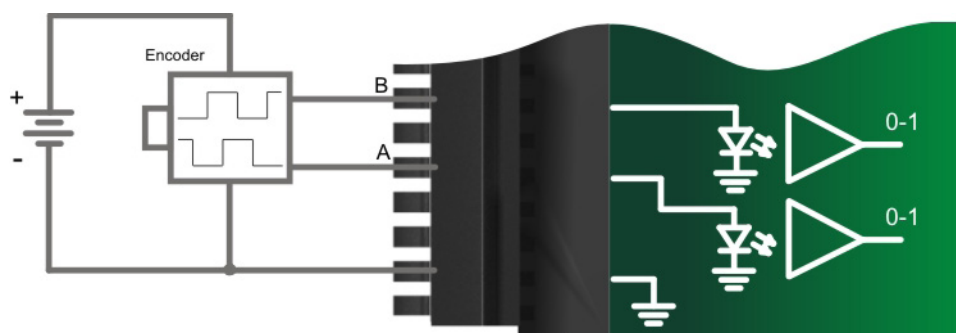
Application/Use: Activation of analog devices (frequency inverters, proportional valves and etc).



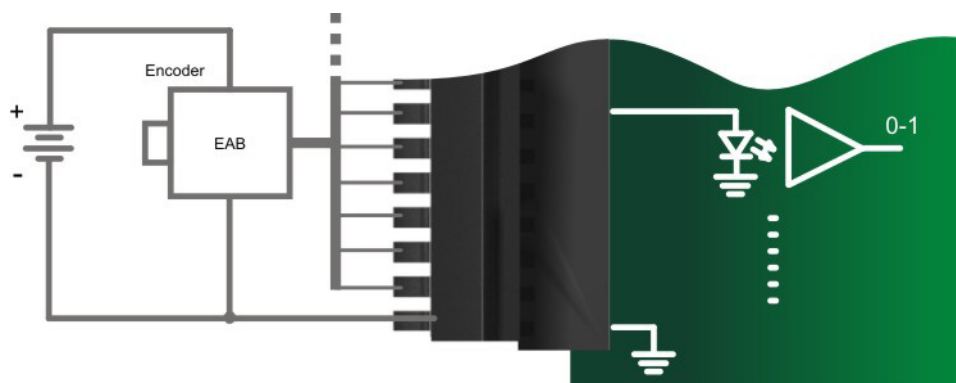
Incremental Encoder¹

Input able to read the pulses created by encoder¹ channels.

The pulses treatment is executed internally by the module.



Absolute Encoder¹



¹ - Check the Notes and Acronyms List at the beginning of this document

03

Installation

Introduction

This section aims to inform all the precautions necessary to install properly the controller P7C¹ at one electrical panel that has others items. It is also important to mention that the recommendations exposed at this chapter are applicable to any electronic equipment installed into a electric panel.

One of the biggest concerns about the project of one electrical panel is to minimize not only the problems related to electromagnetic interference, but also the harmonics created by the electrical noises at transmission cables, current oscilations at electrical motors, switching of coils at contactor, frequency inverters, etc.

This way, it will be presented some recommendations that must be observed during the project, assembling and installation of the electric panel.

Considering the protection against electromagnetic interference, it is necessary to remind that to obtain a total protection level, none of the items described below can be ignored, once that forgetting any one of them can result in allowing the panel vulnerable to this type of interference.

In order to show the attention that must be adopted, lets consider a pannel project that uses a PLC¹ P7C¹ controlling two motors, one using a direct start and other using a frequency inverter. Additionally, at our project we'll be activating pneumatic valves (with DC supply) besides monitoring analog signals of temperature and pressure. With this scenery, it is possible to exemplify the main cares that must be considered at the electric project of a panel containing one PLC¹.

Considering the electric project proposed, let's implement the project of the electric panel, emphasizing the itens necessary for the safety and protection against noise and electromagetical interference.

The project will be implemented in the following steps:

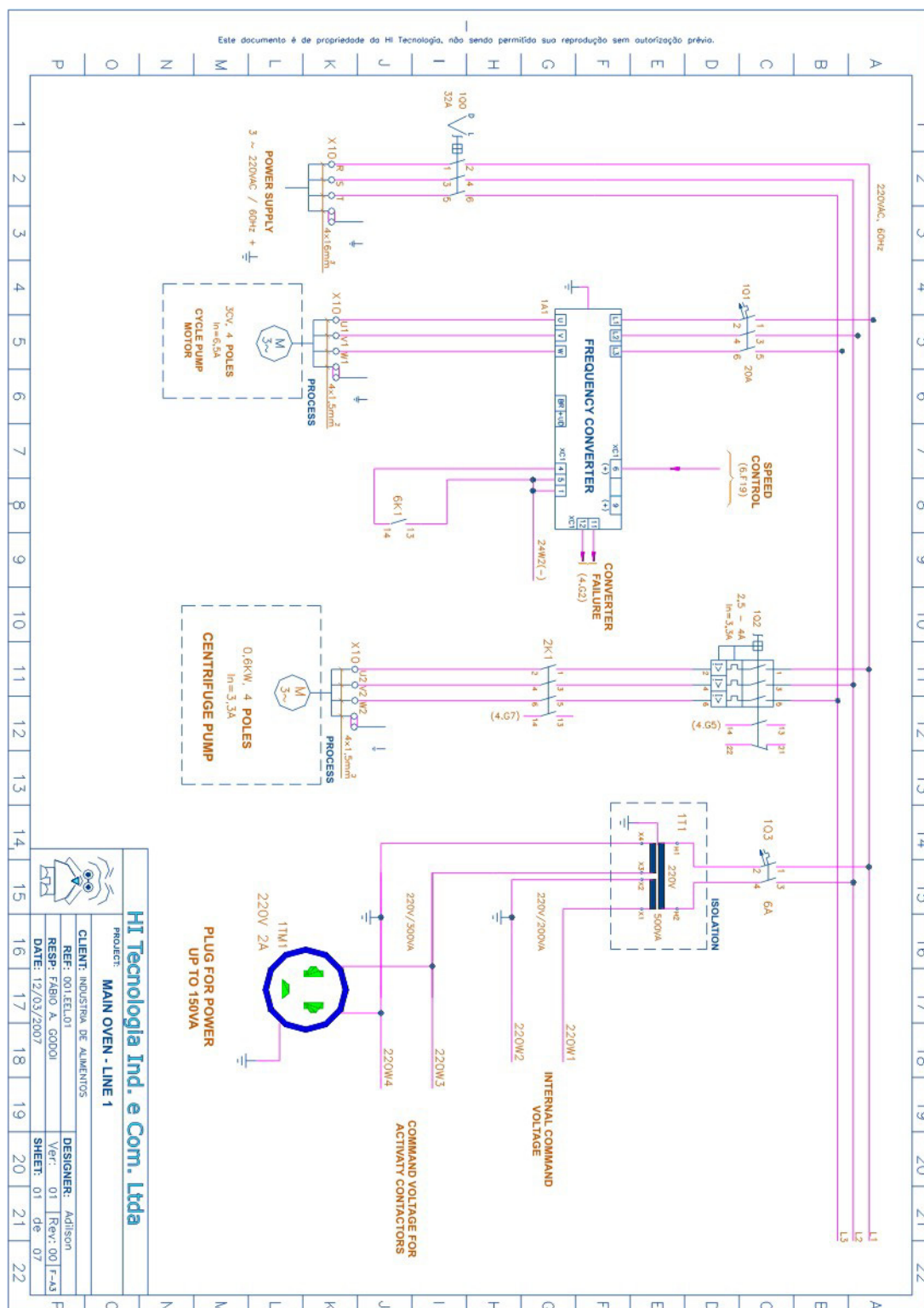
- Electrical project
- Distribution of components at the electric panel
- Internal wiring distribution at the electric panel
- General considerations about panel devices
 - Insulation transformer
 - Grounding
 - Line filters, RC filters, protection diodes against DC outbreaks
 - Frequency Inverters
 - Power Supplies

Considering the electromagnetic interference, it is necessary to consider that to have a total protection level, none of the items must be disrespected, once the lack of any item can turn the panel vulnerable to electromagnetical interference. This manual will not discuss theoretical topics about these subjects. This way, we suggest the reading of technical documentation for a better comprehension.

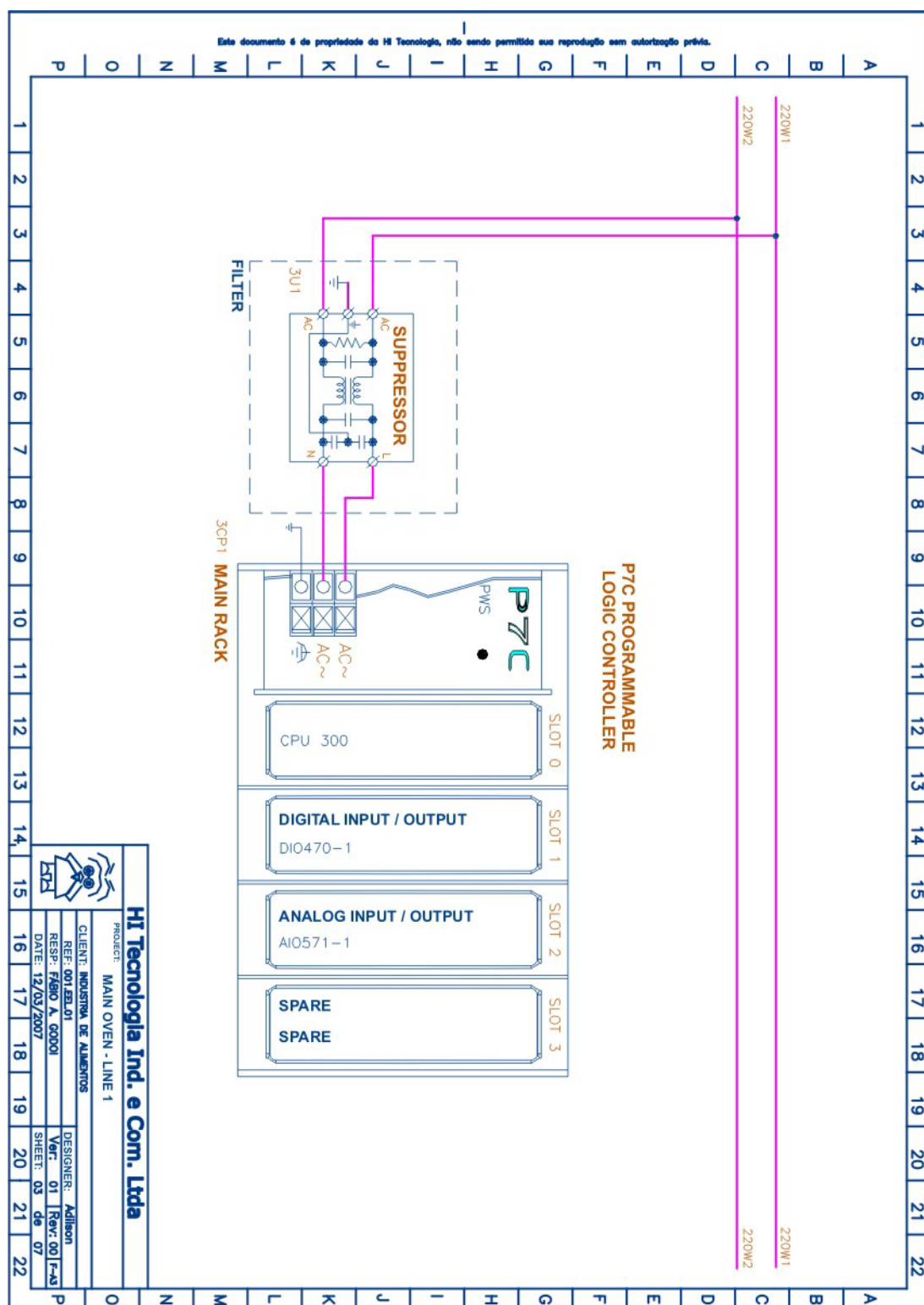
Note that the quantity of notes and cares that must be taken can seem exhaustive, but it is important to keep in mind that the use of the recommendations proposed is less onnerous than solving problems when the panel is already installed and the application/process is stopped due to fails at the panel project.

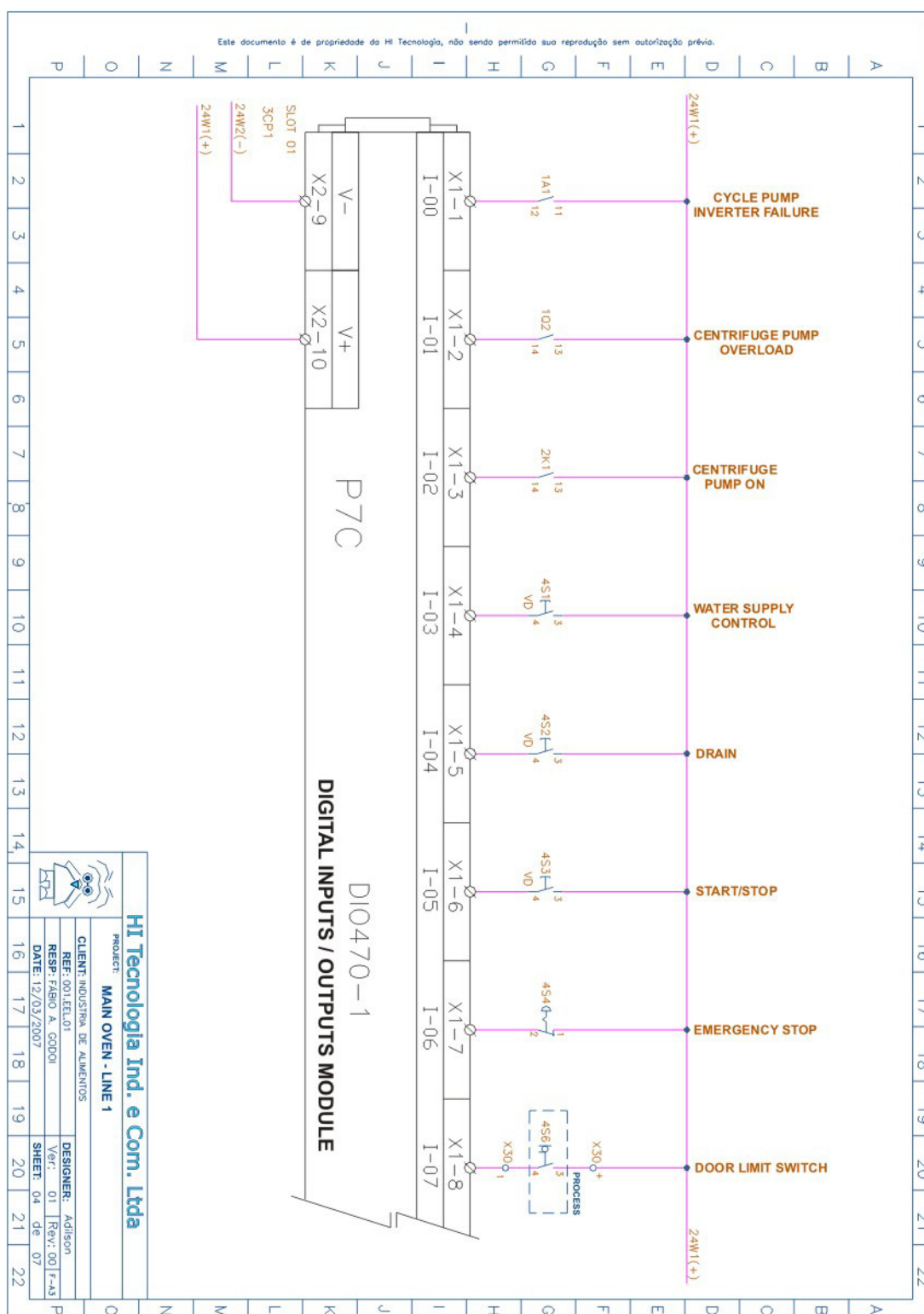
1 - Check the Notes and Acronysms List at the beggining of this document

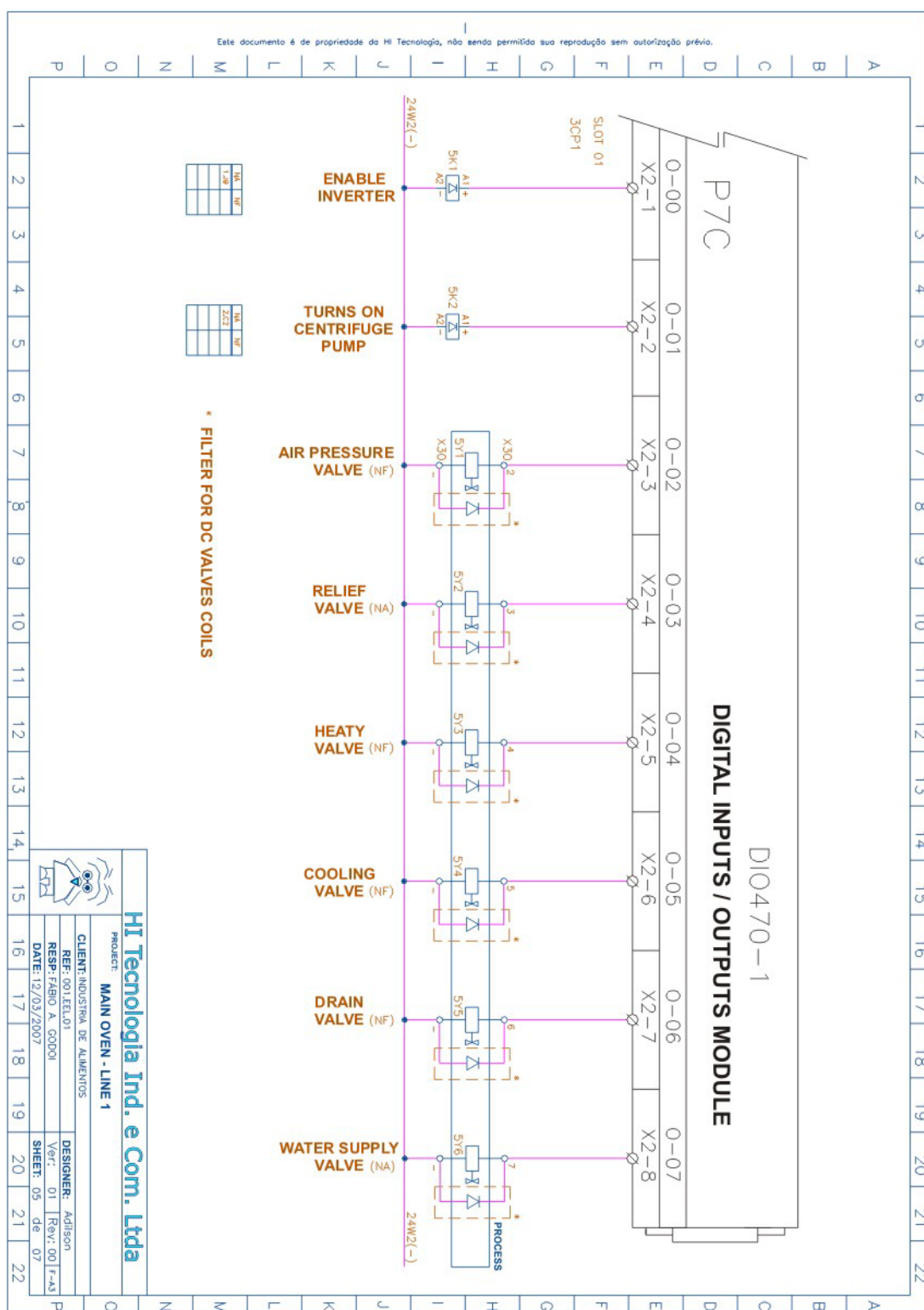
The following pages present the project of the electric panel proposed.

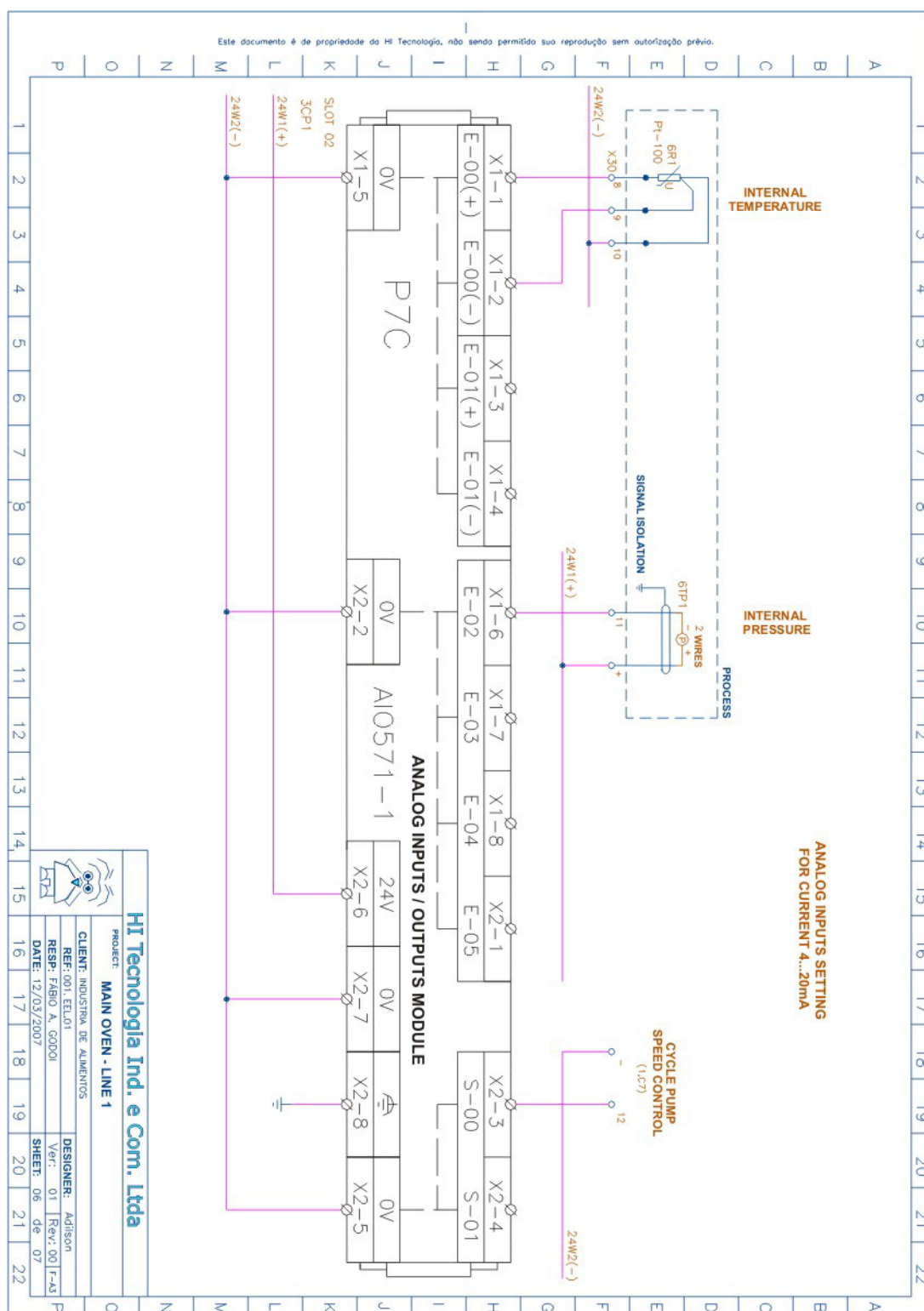


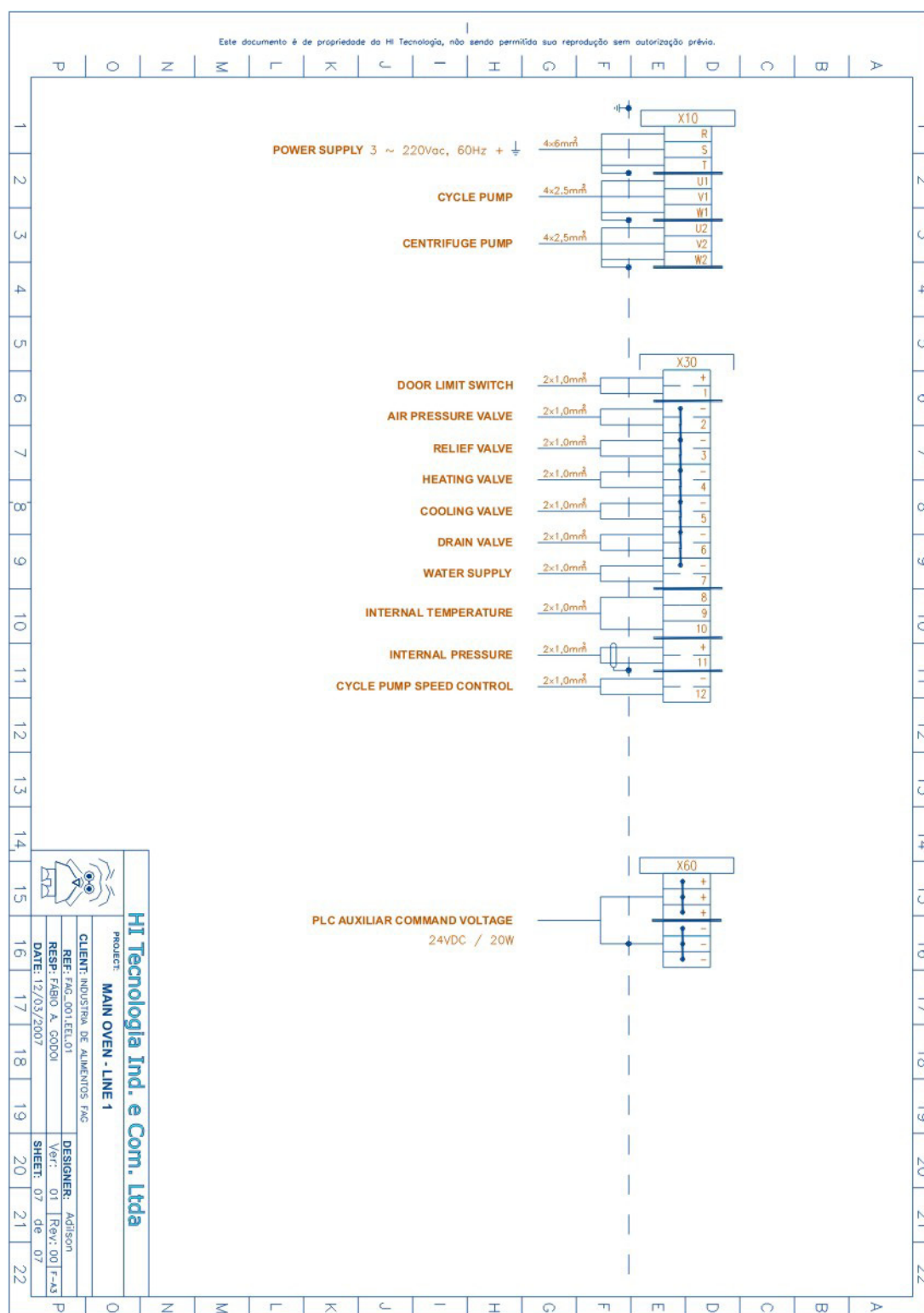










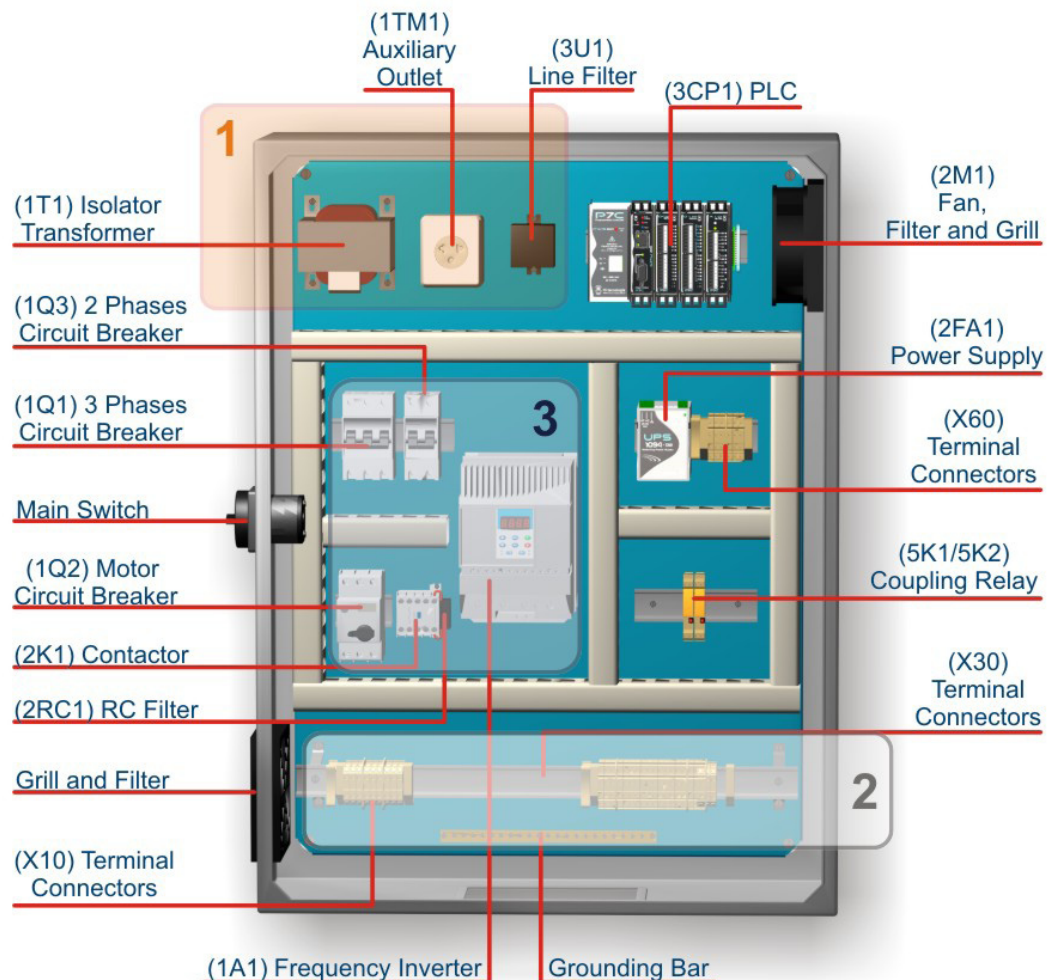


Electric panel component layout

Once defined the electric project, it must be evaluated, in function of the components that will be used, the size of the electric panel in order to arrange all the items defined for the project. After this, it must be functionally shared the space of the panel layout circuit, in order to isolate the components at the following groups:

- Panel input supply (indicated by the number 1 at the image)
- Panel input connectors¹ (indicated by the number 2 at the image)
- Items related to power (indicated by the number 3 at the image)
- Items related to process signals (digital/analog inputs, etc.)
- Exhaustion systems, auxiliar plugs, etc

The following picture presents a possible layout for the electric panel, identifying the main blocks arrangement:

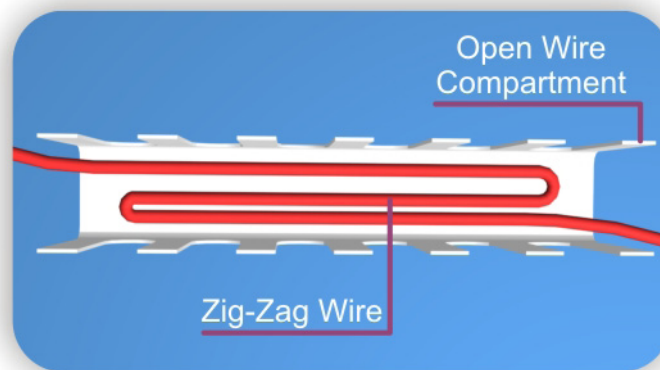


¹ - Check the Notes and Acronyms List at the beginning of this document

Electric panel internal wiring distribution

Cables are a part of the installation process, being very vulnerable to electromagnetic noise. This way, it is necessary to adopt some actions to prevent against noise caption.

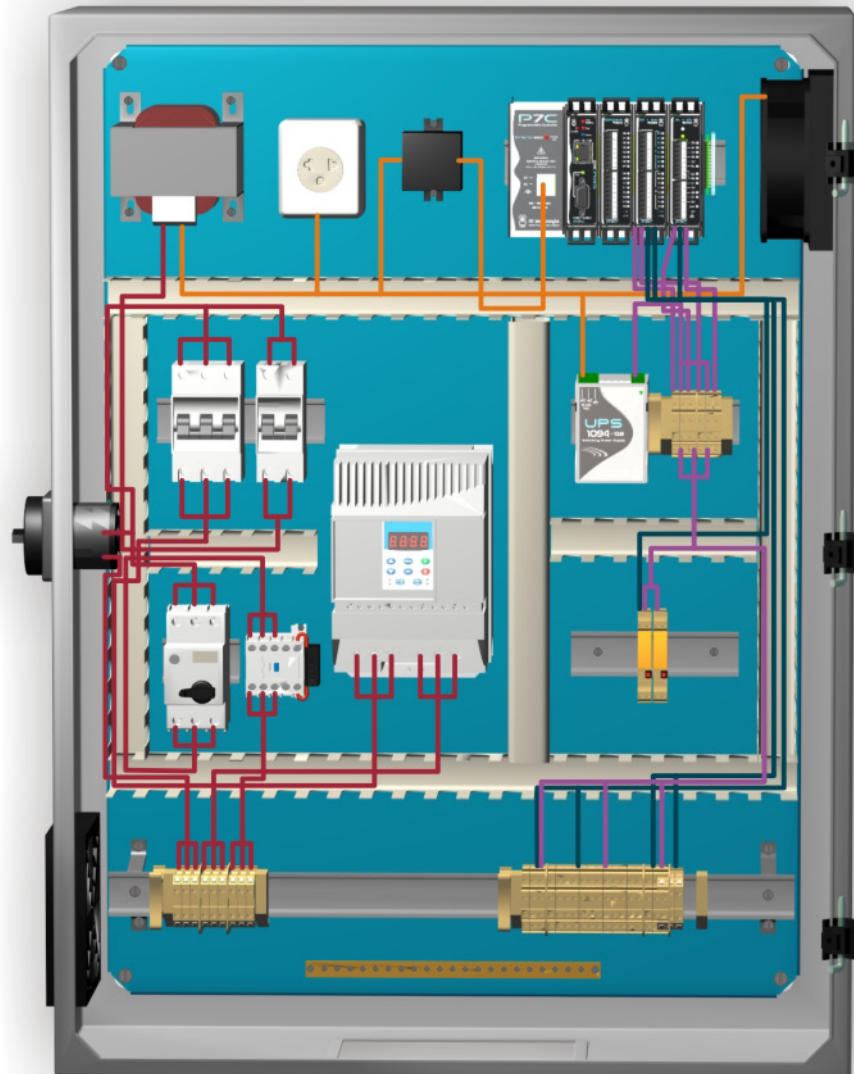
While wiring electrical components inside a panel, it is common to use wires with a length bigger than what is necessary to facilitate possible maintenance procedures or even future relocations of the components. In this case, it is recommended to place the exceeding quantity of wire following a zig-zag path inside the wire compartment. This way, if a magnetic field incise at the conductor, the noise caused will be minimized due to the simultaneous incidence of the field and several sections of the conductor in different directions.



For the analog signals cables, it is recommended to use them in a shorter length, in order to avoid excesses that may be vulnerable to the caption of noises.

In addition, a care should be taken so that the power cables must not be placed together with I/O signals and communication wires compartment. This observation is of great importance because the power cables carry large amounts of electrical current. As a consequence, it will generate a magnetic field, whose intensity is sufficient to produce noise in the signal and communication cables.

By designing the physical layout of the cables on the panel, choose separate paths between the power cables and other cables. Moreover, it is necessary to avoid placing signal cables alongside the power cables, as magnetic field produced by these cables can disrupt system operation.

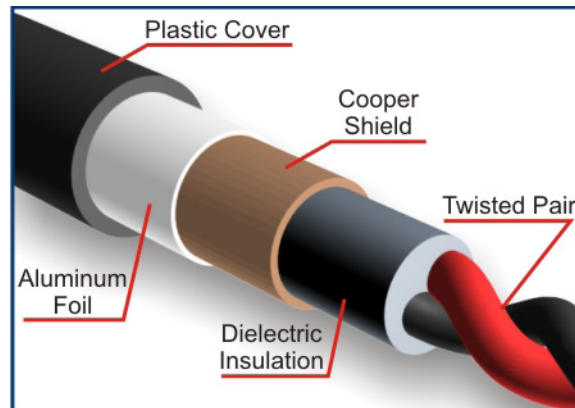


- Voltage Connection - 220V (Secondary Winding of the Transformer)
- Power Connection (Motors, Inverter, Transformer)
- 24 V Connections (Distribution)
- I/O Signals Connection

For analog cables, it is recommended to use cables with twisted pair and grounding shield. This shield should be grounded in only ONE of its ends, preferably at the end of the side panel.

In environments with electromagnetic noise, whose frequencies are higher than 10MHz, such as places where there are communication radios (walkie-talkies), it is recommended to use double shielded cables. This cable consists of an inner layer of copper shield and an outer layer of aluminum foil. The inner layer of shielding is responsible for blocking noise in the network frequency (60Hz) and also frequencies below 10MHz, while the outer layer prevents the spread of noise with frequency greater than 10MHz.

The next picture will show this cable:



When installing the cable with double shield, ground the copper shield on only one end (preferentially at the end connected to the electrical panel). On the other hand, the protection shield of aluminum foil should be grounded at BOTH ends of the cable.

However, the grounding at both ends of cable must be ensured to guarantee the same potential over ground points. Otherwise, if there is a potential difference between grounds, there will be a current flow in grounding shield, which is an undesirable effect. In short, ground points shall not show difference in potential.

General notes about items of the panel

Insulation Transformer

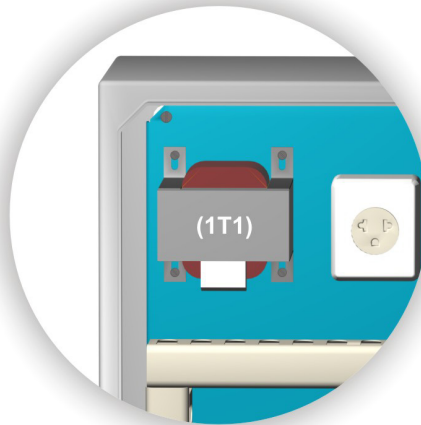
It is a single phase transformer used for feeding the circuits of the electric command. It usually has primary winding sized for 220 or 380 Vac and the secondary winding for 220 Vac. Its function is to generate a 220 Vac command voltage and isolate electrically the primary winding from secondary winding, as also to attenuate outbreaks or noises caused by the electric supply of the primary.

The secondary winding is used for feeding the electric command equipments, as: power supplies, PLCs, lamps and etc. It is recommended to ground one side of all the secondary winding, because, this way, there will always be a neutral conductor and another phase one.

However, when using solenoid valves or 220 Vac contactors, it is considered a good project practice to size the isolation transformer with two or more secondary. In this way, one of the secondary windings will feed exclusively electronic equipments (PLCs¹, transmitters, sensors and their power supplies), and another secondary winding will feed only solenoid valves and contactors.

The recommendation of sizing two or more secondary windings must be applied, because the solenoid valves and contactors are devices which produce electromagnetic noise (due by short current peaks) when turned off. Feeding them using another secondary winding other from the one which supplies electronic equipments may minimize the interference due to these transients.

1 - Check the Notes and Acronyms List at the beginning of this document



Grounding

Grounding is an essential item in any electrical equipment. Its functions are:

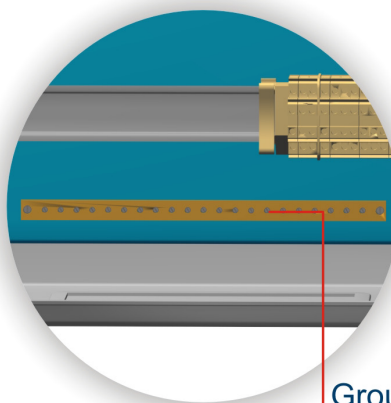
- Protecting the user from the electrical equipment, providing a way for this passage of electric current when the occurrence of lightning or even a failure of insulation.
- Discharge static charges exist in the frame of the equipment to the earth.

The location where the electric panel will be installed should be provided by a system of proper grounding. For the installation of a ground of good quality, it should be followed some criteria, such as measuring the soil strength, the physical distribution of copper bars (when there is more than one), soil acidity, etc. The technical literature on grounding is varied and quite deep, guiding the reader in detail.

In designing the electric panel, or during its assembly, it should be provided a “grounding bar” in the electrical panel, whose fixing will be done in a point (the lowest possible) of the mounting plate. This grounding bar is made of copper and provided with several threaded bolts already set at the bar, through which the connection will be made with the equipment panel that need to be grounded.

Each equipment that will be grounded must be connected to the grounding bar by using an exclusive conductor (green and yellow), uninterrupted, leads or amendments, once being related to grounding, it must follow specific standards, and they prohibit this sort of artifices.

The life cycle of equipments as PLCs¹ depends on the quality of the electrical installation, considering the grounding and power equipments, such as a line filter, for example. This way, one of the methods to extend the life of the PLC ¹ is to provide a good grounding system to the electrical panel.



Grounding Bar

¹ - Check the Notes and Acronyms List at the beginning of this document

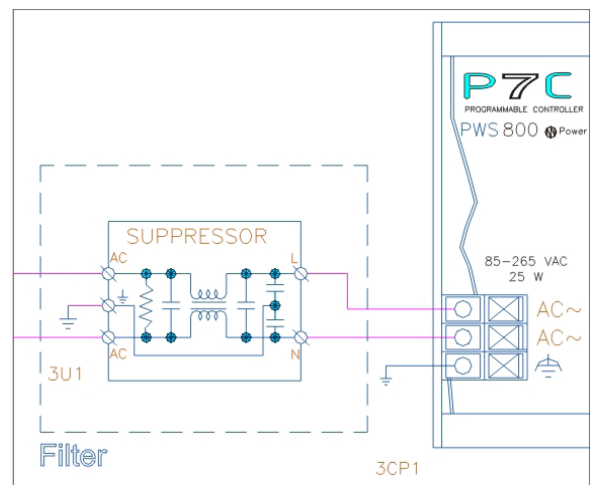
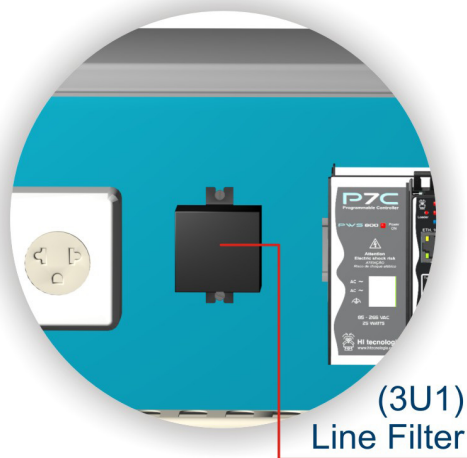
Line filters, RC filters and “Free Wheel” diodes

Line Filters

Electrical company power line usually carries along various types of disturbances and noise, which may be originated from the company itself, or even from a consumer in the neighbourhood.

One example of it is the activation of an electric motor or any appliance (blender, hair dryer), which generates electromagnetic noise that is transmitted through its supplying.

In order to minimize such problems, it is recommended to use line filter, whose function is to filter the power received at its input and provide it as free as possible of disturbances. Note that the quality of filtering is related to the quality of the line filter.



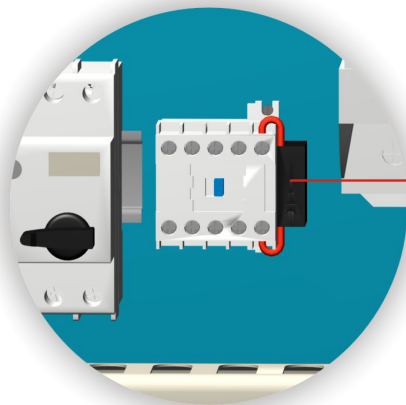
RC filters and Free Wheel Diodes

All inductor generates a transient voltage at the time when it is turned off, due to the energy stored on in, as a magnetic field. This way, the sudden decline in the value of your current at the time of shutdown creates a disturbance which is propagated as a noise to neighboring circuits. The more sensitive neighbors' circuits will be affected at the time of transition.

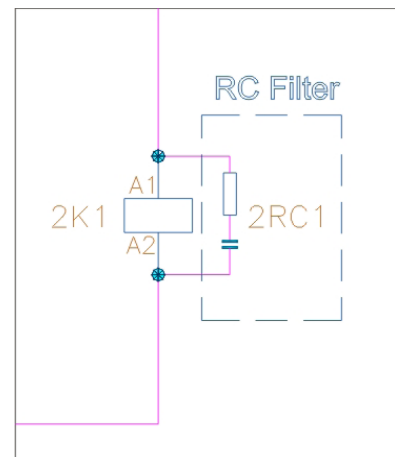
This way, for solenoid valves, contactors and relays supplied by alternating current, it is recommended the use of RC filters, because, when turned off, this filter will absorb the remaining energy of the inductor, attenuating the generation and propagation of noises.

For solenoids, contactors and relays feeded with direct current, it is recommended using a diode, called Freewheel, which physical installation is through an antiparallel link, with the element to be activated. So, at normal operation of the coil, the diode is reversely biased. However, at the time of the shutdown, the inductor still has some energy and there will be a natural polarity reversal in the voltage produced by the coil (due to Lenz's law), which makes the polarized LED directly. This way, there is a way for this energy to be dissipated through the diode and no longer radiated in the form of an electromagnetic disturbance or transient voltage.

1 - Check the Notes and Acronyms List at the beginning of this document



(2RC1)
RC Filter



Frequency Inverters

Frequency inverters are very versatile equipments. However, they generate a large amount of electromagnetic noise. This effect is the result of powering the internal switching circuits, for example, the PWM (Pulse Width Modulation, modulation per pulse width) circuits, as during the operation of this type of circuit there are very rapid transitions between states of conduction and block, generating large current peaks in supplying them.

Moreover, for being a non-linear equipment (currents and voltages are not proportional to each other), there is the generation of harmonics. The presence of harmonics in the circuit cause the following effects:

- Reduce the power factor at inverter's input and if there are inverters in large quantities, there may be a decrease in overall power factor of the installation.
- Excessive heating of the neutral conductor, if it is not sized properly. On systems with the presence of harmonics, there may be current flow in the neutral conductor, because the harmonic components do not cancel themselves, as well as the fundamental components are in the triphase systems. A solution to this problem would be to oversize the neutral conductor. However, this approach adds costs at the installation process.



(1A1)
Frequency
Inverter

The harmonics of the input current depend on the values of the impedances in the circuit. This way, the addition of inductors increases the impedance of the input circuit, limiting the harmonic currents. This approach helps increasing the input power factor, and reducing the effective value of input current, eliminating the need to install oversized conductors.

For more information about the sizing of these inductors, check the installation manual provided by the manufacturer of the frequency inverter.

1 - Check the Notes and Acronyms List at the beginning of this document

Installation

Besides creating harmonics, another unwanted effect of the frequency inverter performance is generating electromagnetic noise, because of the internal switching circuits present at the equipment.

As in the case of inductors previously mentioned, it is recommended to install filters to remove these noises. Manufacturers typically offer their own line of filters for electromagnetic noise to be installed in their products, with information for sizing are available on installation manuals of the frequency inverters.

In addition to the filter placement, it is recommended the use of shielded cable with double insulation (as mentioned in "Cabling") for the connection between the frequency inverter output and the motor. If this option is not possible, there is the alternative of making the connection between the motor and the inverter, through individual cables placed insided a grounded metal wire pipe.

It is recommended to use twisted pair and cooper shielded cables for the ones that transmit analog signals for control.

Power Supply

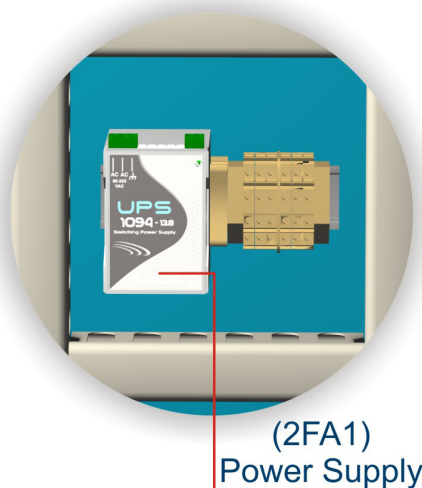
It is very common the use of switched power supplies to provide command voltages of 12 to 24 Vdc at electric panels.

Besides providing 24Vdc for the internal equipments, for many times it is necessary to send this vol-tage to supply sensors and process actuators. This sending is done by using a conductor that connects the equipments in a process. However, the distances are usually large and the conductor passes through several places that may cause mechanical damages at the conductor (which may cause short-circuit) or even the caption of electromagnetic noises.

On a situation like this, where it is necessary the supplying of the sensors or actuators in the field, it is recommended to use two power supplies, an exclusive for all the internal equipments , and other exclusive power supply for the instruments in the process.

This is a very important recommendation, because if there is only one power supply at the panel and if a short-circuit happens at the 24Vdc field conductor, the voltage will drop immediately to zero. In this condition, the internal components of the panel will be affected because they will not be supplied with 24Vdc, while a short circuit is happening.

This way, with two power supplies at the panel, if a short-circuit happens at one of the equipments in the process, not only the internal components will not stop being supplied, but also the internal equipments will not be affected by electromagnetic noises.



1 - Check the Notes and Acronysms List at the beggining of this document

Installation

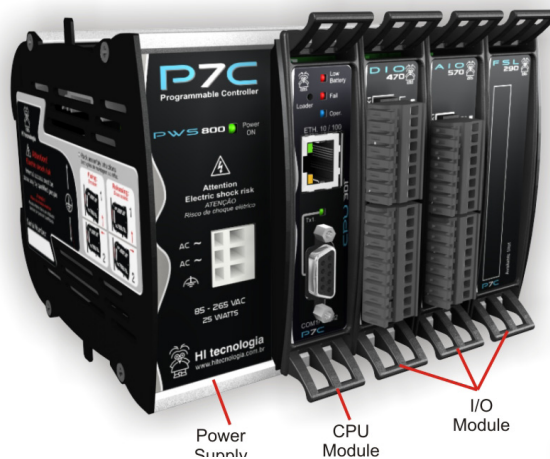
04

Technical Specifications

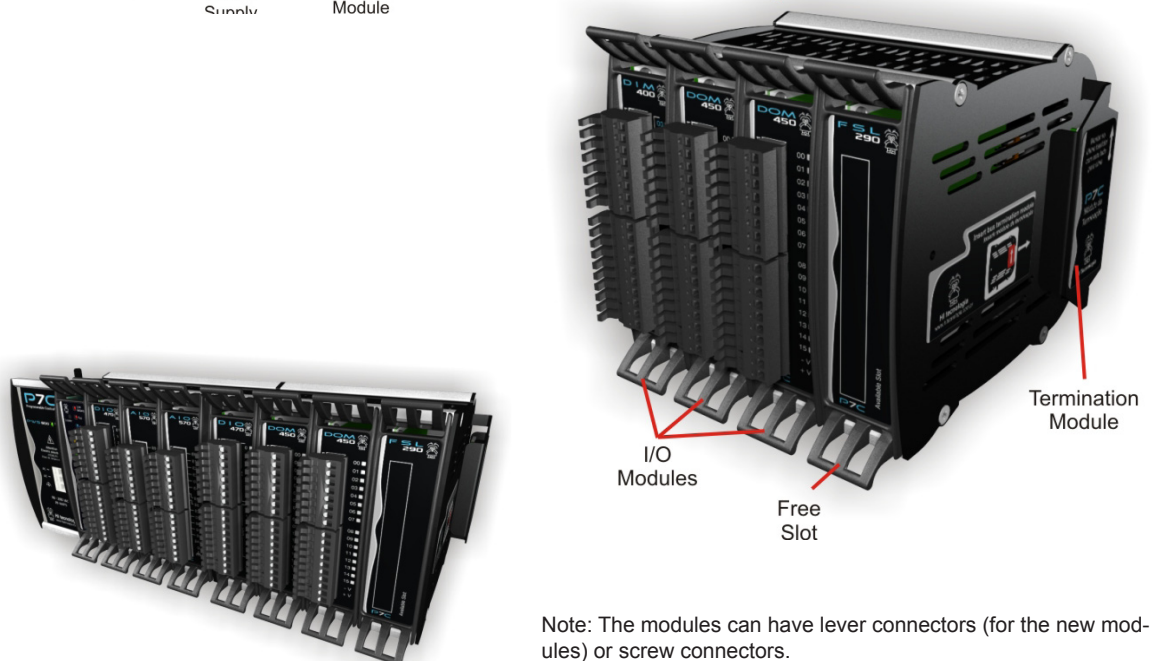
Presentation

P7C¹ programmable controllers line was developed for attending machine and process control applications. This PLC¹ has up to 368 I/O¹ points at its full configuration and offers all the others HI controllers versatility, including also new and exclusive features. Its design is based on expansible racks, supporting up to 4 hardware modules per rack. The basic configuration is composed by a main rack with power supply and capacity up to 4 modules. On the other hand, the Full configuration can be composed by 1 main rack + 5 expansion racks, providing 24 slots¹ for use. The racks interconnection must be done always on the right side of the rack, using the connector¹ placed at the backplane¹.

Main Rack



Expansion Rack



Note: The modules can have lever connectors (for the new modules) or screw connectors.

¹ - Check the Notes and Acronyms List at the beginning of this document

Applicable Standards

P7C¹ controller was developed for attending CE certification requirements, being adherent to the standards defined by IEC61131-2. According to the criterion defined by IEC61131-2, the equipment is able to operate on the named “Zone B”, attending to the specification of the following standards:

Standards	Name
CISPR11, CISPR16-1	Irradiated interference
CISPR11, CISPR16-1 and CISPR16-2	Conducted interference
IEC61000-4-2	Electromagnetic discharge immunity
IEC61000-4-3	Irradiated eletromagnetic fields immunity
IEC61000-4-4	Fast transients immunity
IEC61000-4-5	Immunity against high energy outbreaks
IEC61000-4-6	Immunity against conducted radiofrequency
IEC61000-4-8	Immunity against electromagnetic fields

Technical Data – Main Rack AC (300.107.200.000)

Power Supply AC (PWS800)	85 to 265 VAC or 100 to 400 VDC automatic
Consumption	25 Watts máx
Operating temperature	0 to 60 C°
Storage temperature	-25 C° to 80 C°
Humidity	≤90% without condensation
Rack weight	1,0 Kg approximately
Box	Aluminium and Carbon Steel
Protection Degree	IP30
Dimensions	150 (W) x 110 (H) x 115 (L) mm

Technical Data – Main Rack DC (300.107.200.010)

Power Supply DC (DCC850)	10 to 36 VDC automatic
Consumption	30 Watts máx
Operating temperature	0 to 60 C°
Storage temperature	-25 C° to 80 C°
Humidity	≤90% without condensation
Rack weight	1,0 Kg approximately
Box	Aluminium and Carbon Steel
Protection Degree	IP30
Dimensions	150 (L) x 110 (A) x 115 (P) mm

Technical Data – Expansion Rack (300.107.200.100)

Power Supply	Supplied by main rack
Consumption	-
Operating temperature	0 to 60 C°
Storage temperature	-25 °C to 80 °C

¹ - Check the Notes and Acronyms List at the beggining of this document

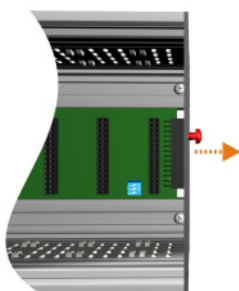
Humidity	≤90% without condensation
Rack weight	0,5 Kg
Box	Aluminium and Carbon Steel
Protection Degree	IP30
Dimensions	110 (W) x 110 (H) x 115 (P) mm
Maximum number	5 expansion racks

Racks connection

The expansion racks must be connected to the right side of the main rack. In the case of adding one expansion rack, it is necessary to remove the screw place at the main rack side (Picture A), and loosen the two screws placed on the rack back side, in order to fit the (red) locks, as shown on the picture (Picture B) and there the connection will be made. For that, approach both racks, in order to fit the locks and connectors¹ together. Push both screws (M3x4) to fix the two locks as Picture C shows.

IMPORTANT: Note the perfect racks connection: they must be aligned after the correct connection. The incorrect connection may result in bad performance or damages to the product.

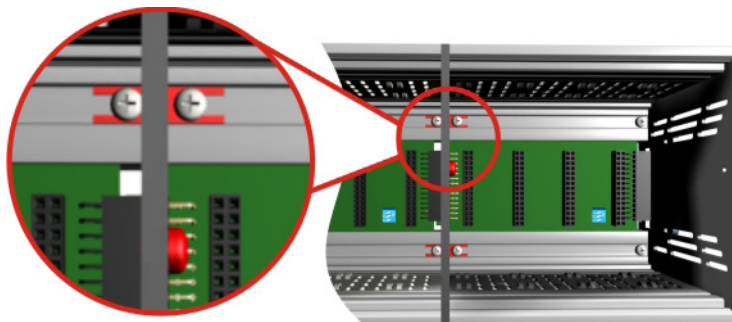
Picture A: Screw



Picture B: Locks / Screws



Picture C: Connection



1 - Check the Notes and Acronyms List at the beginning of this document

Supply

The power supply connector¹ is a spring connector¹ that does not need a screw to be tightened. To insert the wire in the terminal block¹, use a screw-driver at the smaller hole (as indicated by A, at the following picture). Push the screw-driver until open the spring (as indicated by letter B at the following picture) and, after, insert the wire in the corresponding terminal block¹. After this procedure, remove the screw-driver and make sure the connection was completed correctly. To remove the wire is possible to execute the same procedure indicated by letters A and B of the following picture.



ATTENTION



ATTENTION: Electric-shock danger: the bad utilisation may result in fire or death. Read and follow the instructions indicated at this manual:

Make sure that the cables which will be connected to the power supply are disenergized before any operation;

Inspect the cable before each utilisation. Do not use if the cable is damaged.

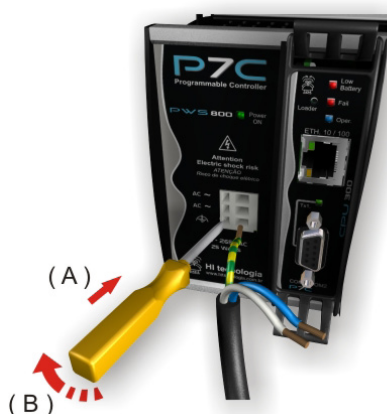
Insert the cable completely into the terminal block¹;

Do not use excessive force to make the connections;

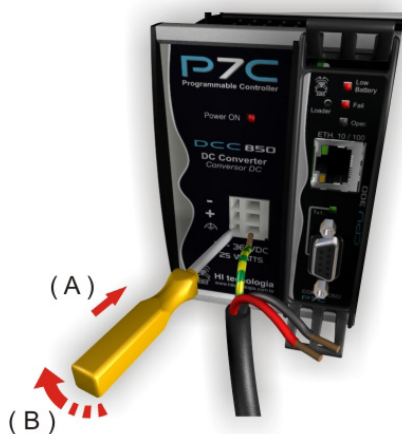
Keep the equipment away from water. Do not use it if wet;

Avoid the overheating. Unwind the cable and do not cover it with any material;

Do not superimpose, drag or put objects above the cable;



AC Rack (PWS800)		
Terminal	Con-	Signal
connector ¹		
1		AC
2		AC
3		Ground



DC Rack (DCC850)		
Terminal		Signal
Connector ¹		
1	-	
2	+	
3		Ground

¹ - Check the Notes and Acronyms List at the beginning of this document



IMPORTANT: The main Rack MRK AC power supply can be from 85 to 265 VAC or 100 to 400 VDC. The main Rack MRK DC power supply can be from 10 to 36VDC. We recommend the use of a rigid or flexible 2,5mm² wire (7mm stripped) or flexible 1,5mm² wire with eyelets terminal.

Earth-Protection Connector



OR



Note: The modules can have lever connectors (for the new modules) or screw connectors.



IMPORTANT: Use connector¹ Faston 6.3 totally isolated for 1mm² green and yellow cable. This connection with the rack can be made at the bottom side, on the top side or both ways.

Addressing

Racks addressing

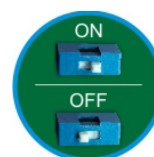
The expansion racks are coupled on the main rack right side, being possible to couple up to five expansions. Each rack has a three straps¹ set named J1, J2, J3. This set, placed at the backplanes¹, (between the connectors¹ of the third and fourth slots¹) must be configured according to the position of the rack, using jumpers¹, as the following:

Identification	J1	J2	J3
Main Rack	OFF	OFF	OFF
Expansion Rack 01	ON	OFF	OFF
Expansion Rack 02	OFF	ON	OFF
Expansion Rack 03	ON	ON	OFF
Expansion Rack 04	OFF	OFF	ON
Expansion Rack 05	ON	OFF	ON

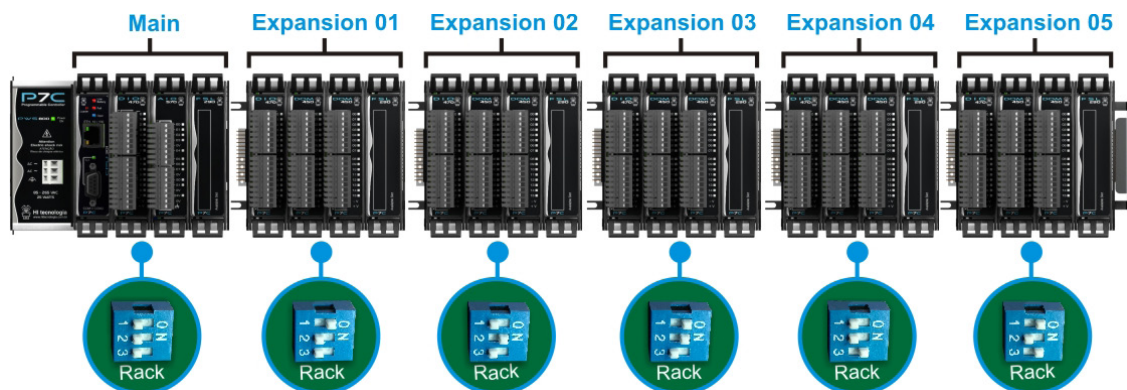
Caption:
 ON: with jumper¹
 OFF: without jumper¹



Caption:



¹ - Check the Notes and Acronyms List at the beginning of this document



Note: The modules can have lever connectors (for the new modules) or screw connectors.

Termination Module – BBT260

The termination module must be, obligatorily, connected to the last expansion rack or, if it does not exist, then it must be connected to the main rack.

IMPORTANT:

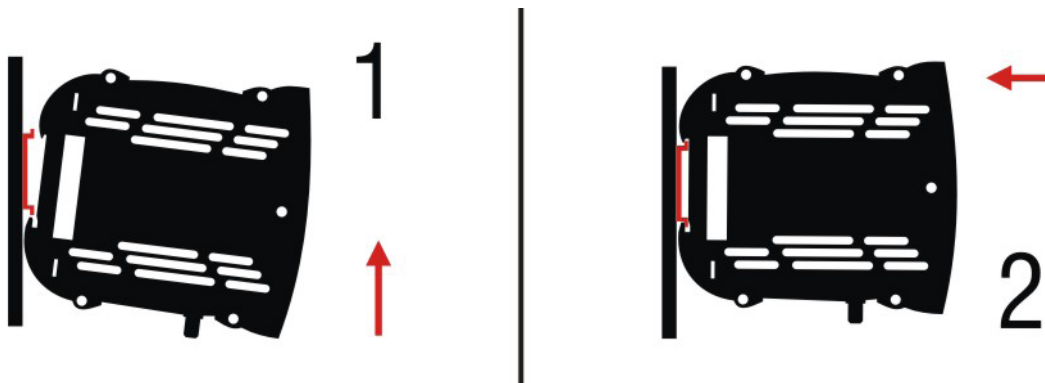
The equipment does not work without the termination module;

The module can not be connected and/or disconnected with the equipment turned on. Make sure the equipment is turned off before any operation;



Fixing the Rack on trails

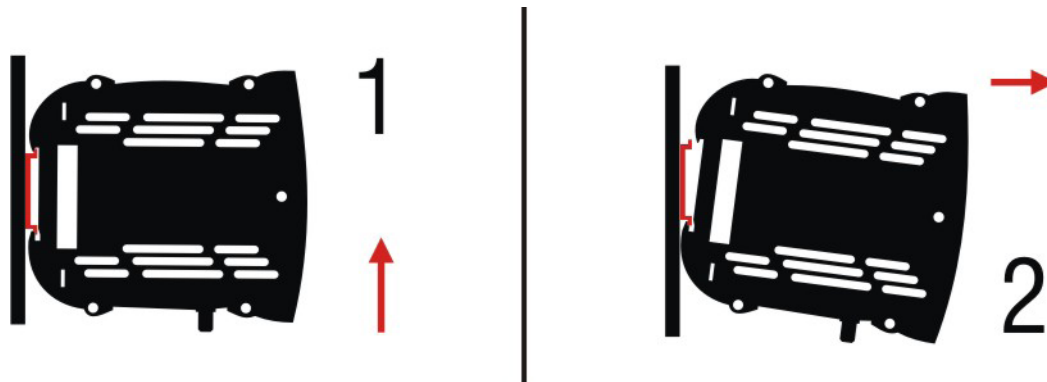
To fix the rack on the trail is necessary to fit the rack lower part (as indicated by number 1, at the picture), pushing from the bottom to the top. To put the rack in the trail just fit the lower part of the rack (as indicated by number 1 at the picture), pushing to the top and at the direction of the trail (as indicated by number 2 at the picture):



1 - Check the Notes and Acronyms List at the beginning of this document

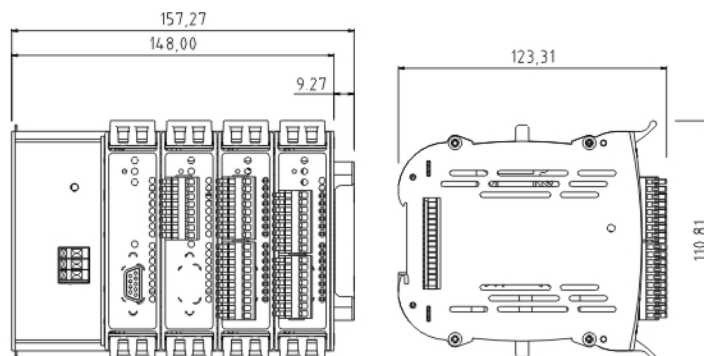
Removing the rack from trails

To remove the rack from the trail, just push it to the top (as indicated by number 1, at the picture) and also move it to the front (as indicated by number 2, at the picture):

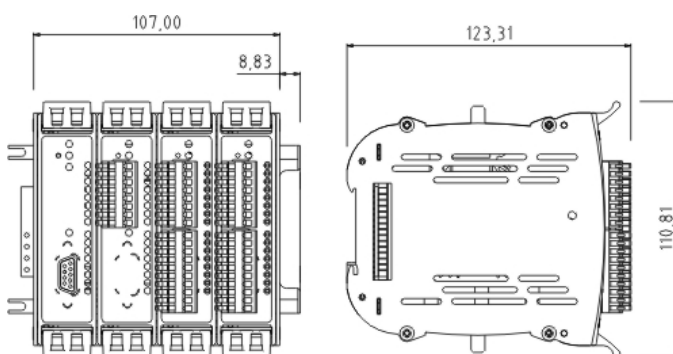


Dimensions (mm)

Main Rack



Expansion Rack



Note: The modules can have lever connectors (for the new modules) or screw connectors.

Part Number

Code	Identification
300.107.200.000	P7C ¹ MRK AC main rack
300.107.200.010	P7C ¹ MRK DC main rack
300.107.200.100	P7C ¹ XRK expansion rack

1 - Check the Notes and Acronyms List at the beginning of this document

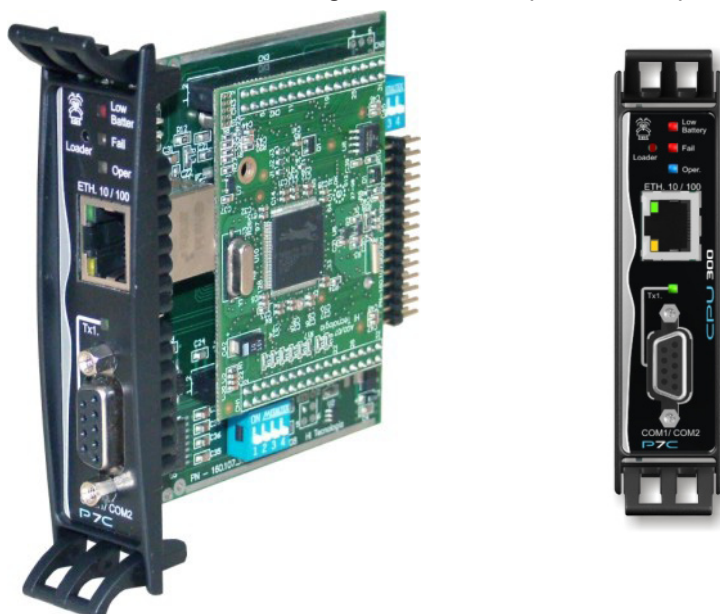
Technical Specifications

05

CPU300 Technical Specifications

Presentation

CPU300 module is the P7C¹ processing module and provides to the user the application memory, data memory, Data Flash¹, Real Time Clock RTC¹) and non-volatile memory (NV-RAM¹) for information storage. It has two RS232-C¹ serial communication channels, being one of them configurable for RS485¹ and one Ethernet¹ channel configurable for 10Mbps or 100Mbps.

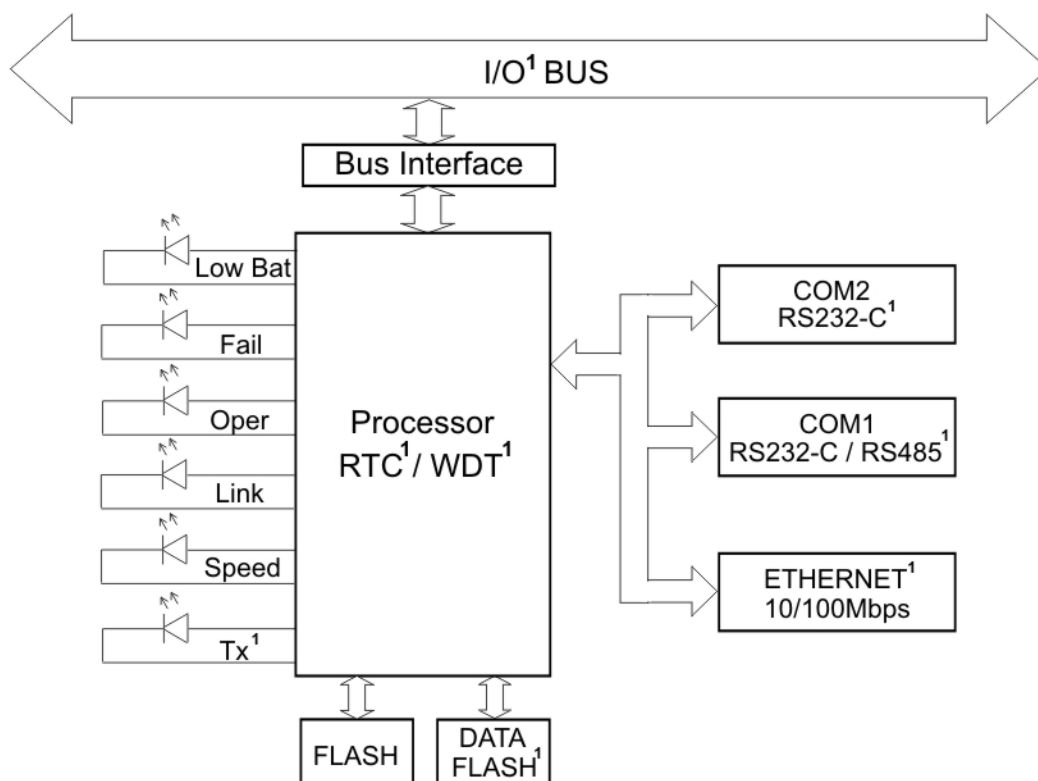


Technical Specification

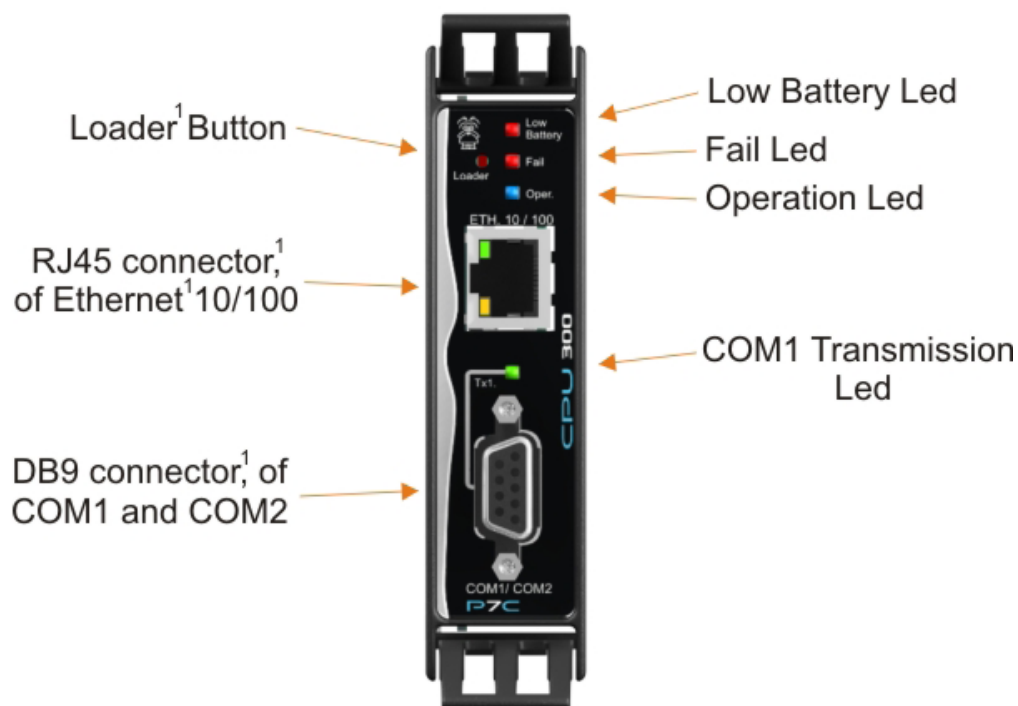
Power supply	5 Vdc (supplied by main rack)
Consumption	0,8 W
Operation temperature	0 to 60 C°
Storage temperature	-25 C° to 80 C°
Humidity	≤90% without condensation
Module weight	0,06 Kg approximately
Dimensions	85 (W) x 83 (H) x 27 (L) mm
Clock	14.5476 MHz x 2
Flash Memory	256 Kbytes
WDT ¹	Yes
RTC ¹	Yes
Battery	Yes (RTC ¹ + NVRAM ¹)
Data Flash	16 Mbits ¹
2 serial channels	Yes
1 Ethernet ¹ channel	10 Mb or 100 Mb
Time/Logic instructions	0,43µs

¹ - Check the Notes and Acronyms List at the beginning of this document

Block Diagram



Process Interface



¹ - Check the Notes and Acronyms List at the beginning of this document

Ground connectors

There are two ground connectors at the side of the module, which are responsible for the contact with the main rack structure.

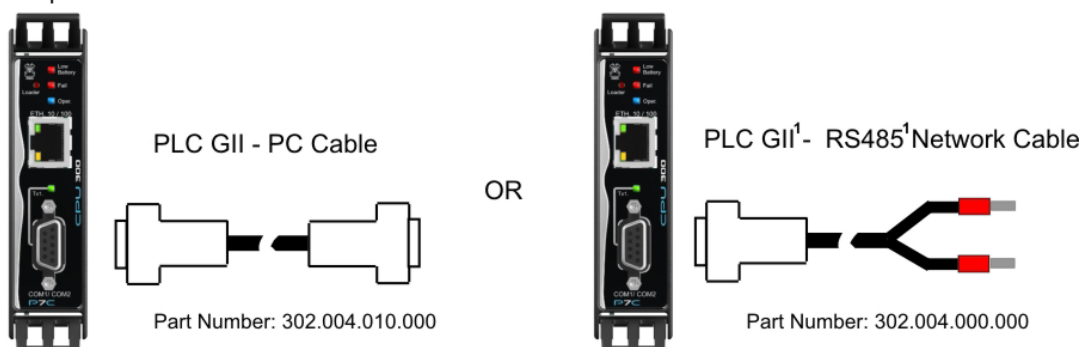


IMPORTANT: When handling the module, be careful to not hurt yourself with the ground connectors, because they have a sharp surface.

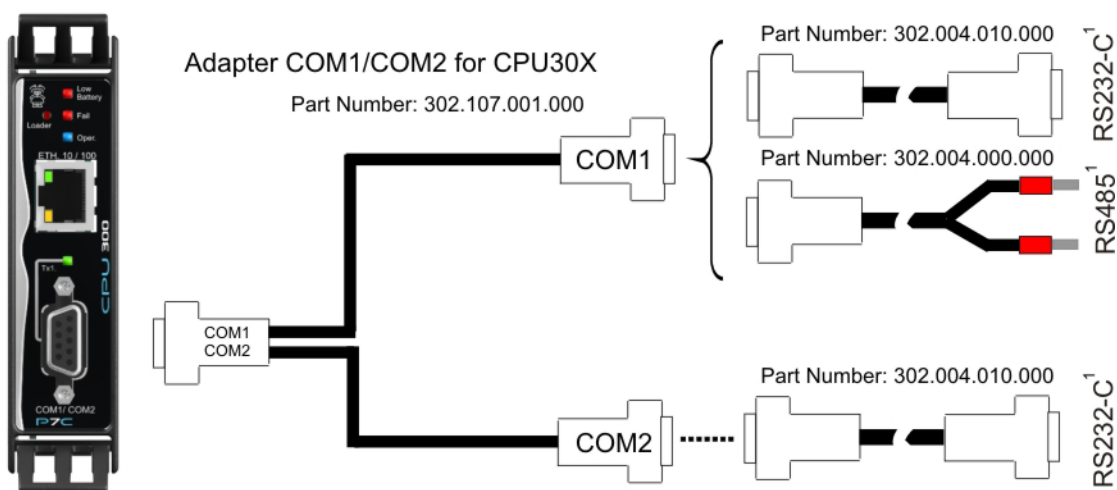


Serial Communication

Example of use that can be done with CPU300.



To use the two serial (COM1 and COM2) it will be necessary to use an adapter to split the connector¹, as indicated at the following picture:



¹ - Check the Notes and Acronyms List at the beginning of this document

Serial configuration (COM1 to COM2)

The module CPU300 has one DB9 connector¹ female, which can be split in two others connectors¹, providing COM1 and COM2.

DB9	RS232-C ¹	RS485 ¹	Direction	Description
1	GND	GND ¹	-	0 Volt
2	RX1 ¹		Input	Receive Data COM1
3	TX1 ¹		Output	Transmit Data COM1
4		+DT	Input / Output	+Transmit/Receive Data
5	GND	GND ¹	-	0 Volt
6		-DT	Input / Output	-Transmit/Receive Data
7	TX2 ¹		Output	Transmit Data COM2
8	RX2 ¹		Input	Receive Data COM2
9	5Vdc	5Vdc	-	5 Volts

Protocols

- SCP-HI¹
- MODBUS-RTU¹
- MODBUS-TCP¹
- ASCII¹ (interface for scanners, bar code readers, biometric readers, etc)

Transmission rate

COM1 and COM2 channels can operate with Baud Rate from 1200 to 38400 Bauds



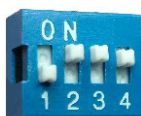
IMPORTANT: Do not turn on the device with the Dip Switch¹ (SW3) different from the configuration presented below. If turned on, it may cause damages to the communication interface of the equipment.



COM1 - RS232-C¹ Simple



COM1 - RS485¹ without termination



COM1 - RS485¹ with termination



IMPORTANT: RS232-C¹ serial simple has the signals: RX¹, TX¹ and GND¹.

When use RS485¹, the termination must be inserted at the equipments placed at the extremity of a RS485¹ network.

Global Parameters

Parameter	Value
Equipment communication identifier	1
PPE ¹ operation support	Deactivated

¹ - Check the Notes and Acronyms List at the beginning of this document

COM1 channel factory parameters

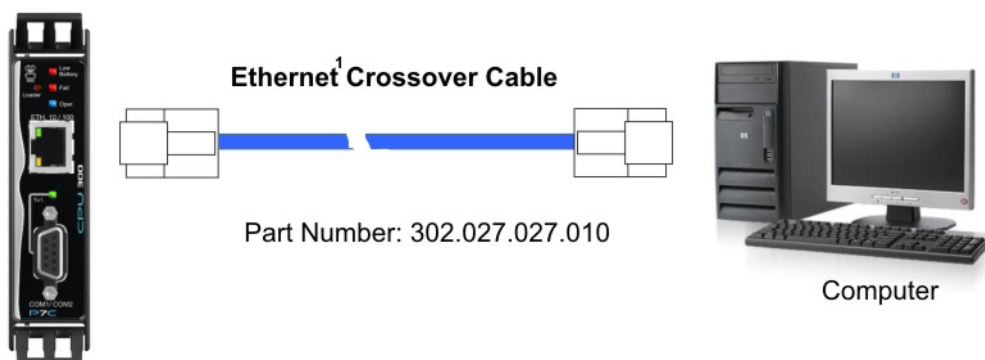
Parameter	Valor
Baud rate	9600
Data bits ¹	8
Stop bits ¹	1
Parity	none
Protocol	SCP-HI ¹
Operation Mode	Slave
Transmission start delay	~2 ms
Driver	RS232-C ¹ (configuration defined at the hardware)
Flow Control	Not available

COM2 channel factory parameters

Parameter	Value
Baud rate	9600
Data bits ¹	8
Stop bits ¹	1
Parity	none
Protocol	SCP-HI ¹
Operation Mode	Slave
Transmission start delay	0 ms
Driver	RS232-C ¹
Flow Control	Not available

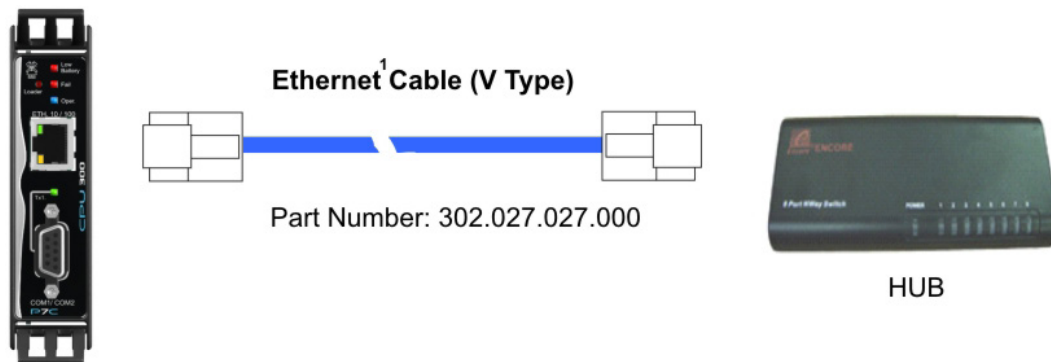
Ethernet Communication

Use example interconnecting the module CPU300 with a computer, using a Crossover cable.



¹ - Check the Notes and Acronyms List at the beginning of this document

Placing a CPU300 module on an Ethernet¹ network (HUB), using a common cable.



Configuration

The module has an Ethernet¹ channel able to operate with the following configuration:

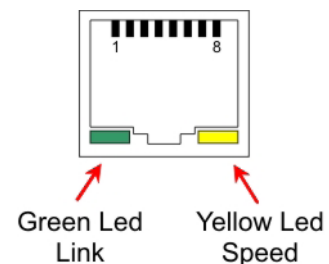
Speed	Communication
10Mb	Full Duplex
10Mb	Half Duplex
100Mb	Full Duplex
100Mb	Half Duplex

The configurations can be detected automatically by the module.

Ethernet connector pin

The module CPU300 has a RJ45 connector¹ female, providing an standard Ethernet¹ channel.

RJ45	Ethernet ¹	Description
1	TD+ ¹	+Transmit Data
2	TD- ¹	-Transmit Data
3	RD+ ¹	+Receive Data
4	nu	not used
5	nu	not used
6	RD- ¹	-Receive Data
7	nu	not used
8	nu	not used



Protocols

- TCP-IP¹
 - UDP¹
 - UDP-Broadcast
- Transporting the protocol SCP-HI¹ or MODBUS-TCP¹

¹ - Check the Notes and Acronyms List at the beginning of this document

Ethernet channel factory parameters

Parameter	Value
Device name	P7C ¹ : NNNN (*)
Application protocol	SCP-HI ¹
Transport protocol	TCP/IP
Mode	Server
Accepts connection	any IP or Port
IP address	192.168.0.200
Port	2016
Gateway IP	192.168.0.1
Subnet mask	255.255.255.000
Connection timeout	200 ms
Connection trials number	8
Inactivity timeout	5 min.
Destination IP	127.0.0.1
Destination Port	1001
Destination Gateway IP	127.0.0.1
Destination Subnet mask	255.255.255.000

Obs(*): NNNN => equipment part number

Loader

P7C¹ controller from the loader¹ version 2.1.00 on, when operating with the loader¹ mode, provides communication resources through ethernet¹ ports and COM1 of the processor module (module present at the slot¹ 0). At COM1 serial channel, the loader¹ mode is configured to operate with the following parameters:

Parameter	Value
Baud rate	38400
Data bits ¹	8
Stop bits ¹	1
Parity	none
Protocol	SCP-HI ¹
Driver	RS232-C ¹
Flow control	none

At the Ethernet¹ channel, the loader¹ mode is configured to operate with the transport protocol UDP¹ and with the access port 65520. The IP address used at the communication depends on the following operational conditions:

2.1 Loader¹ activated remotely (through communication):

In this case, the IP address used will be the same programmed at the PLC¹, by the screen "Controller – Communication Setup" at the environment SPDSW¹.

2.2 Loader¹ activated locally (through the loader¹ button, at the processor module's panel):

In this case, the IP address that will be used is defined by the switch SW2-1 placed at the processor module.

¹ - Check the Notes and Acronyms List at the beginning of this document

SW2-1	IP Address
OFF	Uses the IP address programmed at the PLC ¹ base (the same of the condition 2.1)
ON	Uses the PLC ¹ default IP address: 192.168.0.200

2.3 Invalid communication configuration base:

If the base that stores information about communication parameters is invalid (corrupted), the device will operate in loader¹ mode with the default IP address (192.168.0.200).

Process interface leds operation

Ethernet¹ Channel



Led	Status	Condition
Yellow	On	100 Mbps connection
Yellow	Off	10 Mbps connection

Led	Status	Condition
Green	On	Ethernet ¹ connection established
Green	Blinking	Exchanging data through Ethernet ¹ network
Green	Off	No Ethernet ¹ link detected

Serial Channel



Led	Status	Condition
TX1 ¹	On	Transmitting data to the remote device
TX1 ¹	Off	No communication proceeding or receiving data from the remote device

Battery




Led	Status	Condition
Low Battery	On	Low battery
Low Battery	Off	Battery OK


¹ - Check the Notes and Acronyms List at the beginning of this document



6 blinks

 Device configuration incompatible with the current program

7 blinks

 Invalid application program

8 blinks

 Invalid "FORCE" base. The base that stores the status of forced inputs and outputs was corrupted

16 blinks

 Fail at COM1 communication channel initialization

17 blinks

 Fail at COM2 communication channel initialization

18 blinks

 Fail at COM3 communication channel initialization

● /  Led ON
 ○ /  Led OFF

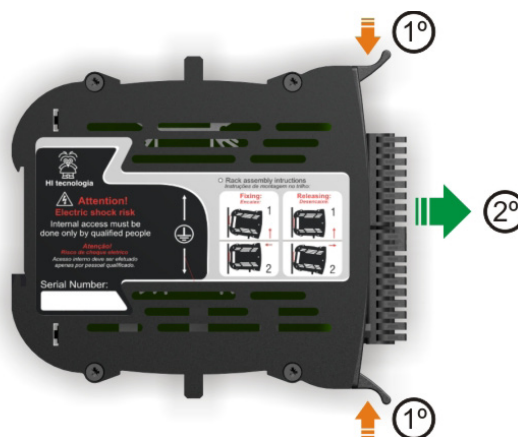
Module Addressing

The module CPU300 has not addressing configuration using hardware (strap¹/switch). It is provided automatically by the controller firmware when connected to the rack.

Removing the module from the rack

IMPORTANT: CPU300 modules **CANNOT** be replaced with the device turned on.

To remove the module from the main rack, push the two locks, one against the other, to unlock the plastic frontal. At this moment, pull them in order to remove them from the rack.



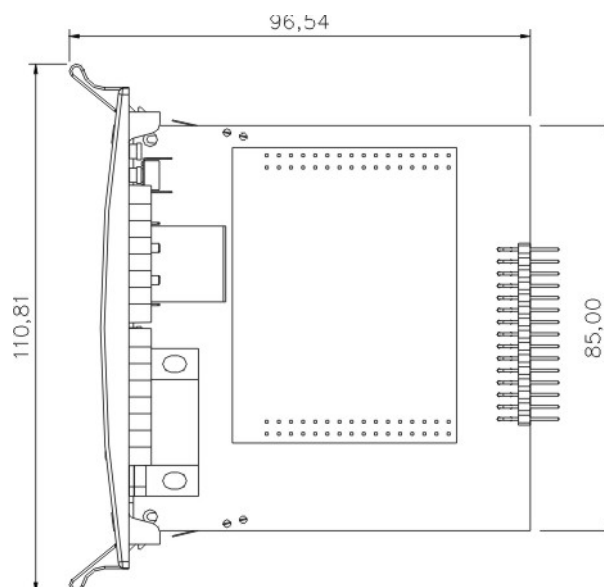
1 - Check the Notes and Acronyms List at the beginning of this document



1° - Press the locks, one against the other, using the two hands (it is not necessary to use a lot of force for that, just the enough to unlock. Each lock needs be moved at +/- 3mm (as indicated at the picture).

2° - With the locks pressed, pull them in order to disconnect the module from the rack (as indicated at the picture).

Dimensions (mm)



Product Part Number

Code	Identification
300.107.300.000	CPU module, RTC ¹ , Flash 512K, 16Mbits ¹ DFlash, NVRam 128K, 2 RS + Ethernet ¹ channels

1 - Check the Notes and Acronyms List at the beggining of this document

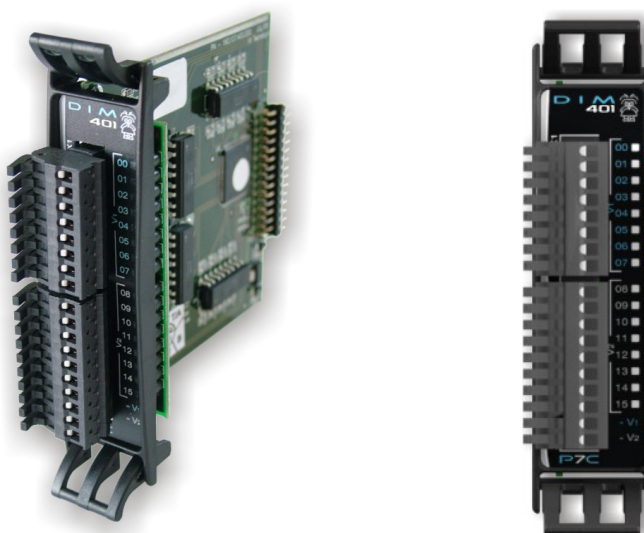
06

DIM400/401 Technical Specifications

Presentation

DIM400/401 modules were developed for the industrial controller P7C¹. They provide to the user 16 digital input channels, totally independent, electrically isolated by opto-couplers, for signals from 12 to 30 Vdc¹ PNP¹ type and individual leds to indicate the output status (on / off). Both modules have automatic addressing, being allowed the simultaneous use of modules at P7C¹. There are also frontal connectors¹ of removable signals and wires connection using screws. They can be easily inserted/removed from the rack even if the controller is operating (Hot Swap¹)

Additionally, the module DIM401 can be used as an absolut encoder interface up to 16 bits¹, once the digital signals acquisition process is executed in a synchronized manner. This feature is already integrated with the module and does not need any extra configuration. For more details, check the topic "Operation as absolut encoder".



Compatible with the module DIM400

Note: The modules can have lever connectors (for the new modules) or screw connectors.

Compatibility

The following table presents the CPU modules compatible with the modules used:

Module	P7C Controller	
	CPU300	CPU301
DIM400*	Yes	Yes
DIM401	No	Yes

(*) – It must not be used with controllers that have 2 expansion racks

¹ - Check the Notes and Acronyms List at the beginning of this document

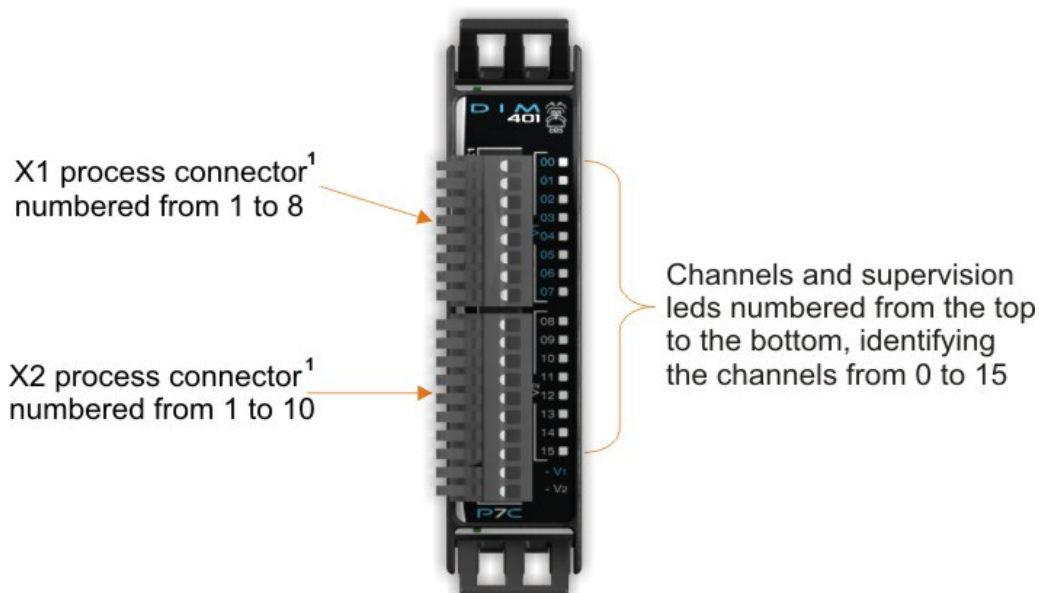
Technical Specification

Power Supply	5 Vdc (supplied by main rack)
Consumption	0,5 W
Operation temperature	0 to 60 °C
Storage temperature	-25 °C to 80 °C
Humidity	≤90% without condensation
Module weight	0,06 Kg approximately
Dimensions	85 (W) x 83 (H) x 27 (L) mm

Technical Specification - Digital Input

Input type	PNP ¹ -12 to 30 Vdc
Minimum voltage for high level detection	10 Vdc
Maximum voltage for high level detection	30 Vdc
Minimum voltage for low level detection	0 Vdc
Maximum voltage for low level detection	4 Vdc
Minimum pulse width for transition detection	290us
Operation frequency	It is directly dependent of the current ladder program scan time.
Insulation voltage	5 kV rms
Protection	Against polarity inversion

Process Interface



Compatible with the module DIM400

Note: The modules can have lever connectors (for the new modules) or screw connectors.

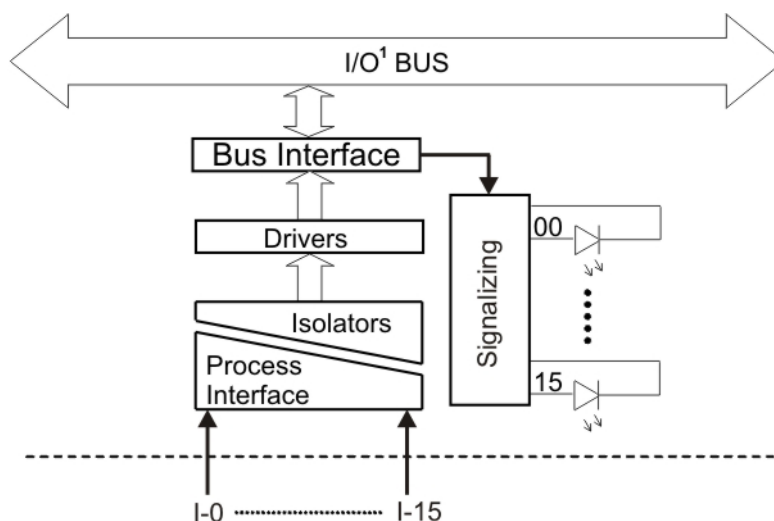
¹ - Check the Notes and Acronyms List at the beginning of this document

The modules DIM400/401 have two process interface connectors¹, which are identified as X1 (8 terminal blocks¹) and X2 (10 terminal blocks¹). These terminal blocks¹ are numbered as the following tables will show:

Terminal Block ¹ X2	Signal
1	08 digital input channel
2	09 digital input channel
3	10 digital input channel
4	11 digital input channel
5	12 digital input channel
6	13 digital input channel
7	14 digital input channel
8	15 digital input channel
9	I-0 to I-7 (-V1) inputs reference
10	I-8 to I-15 (-V2) inputs reference



Block Diagram



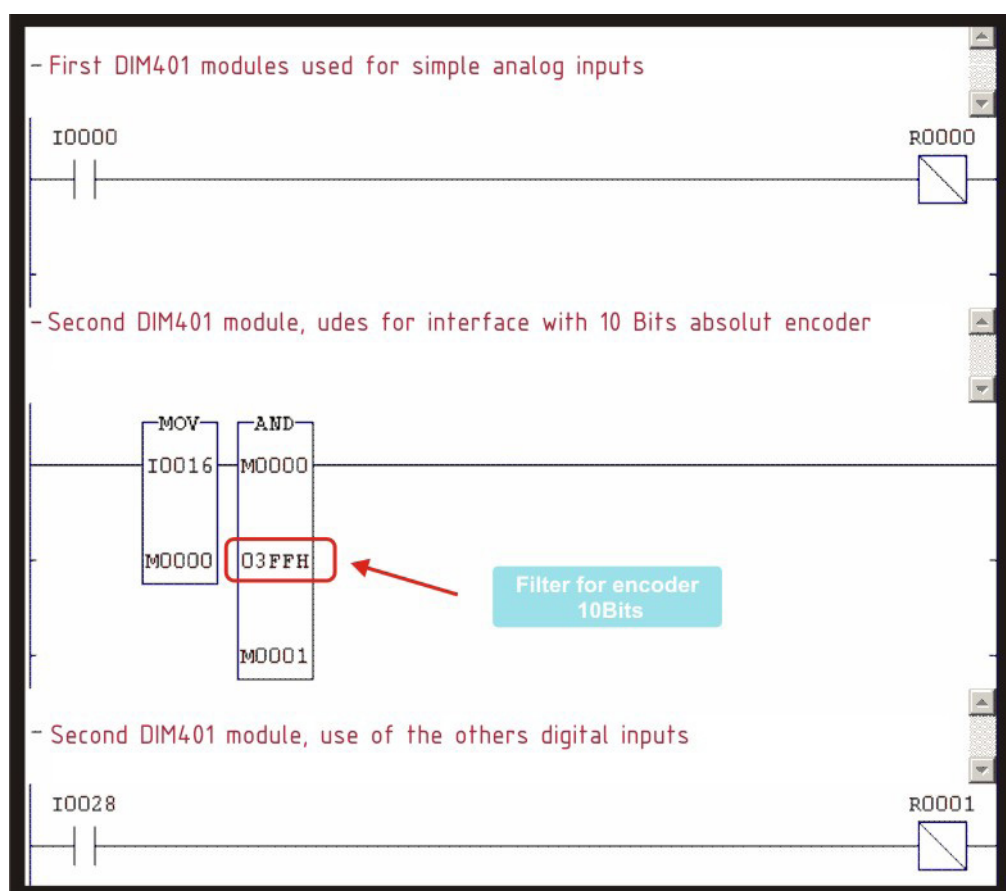
DIM400/401

Operation as absolut encoder (DIM401)

The module DIM401 has an internal mechanism for the simultaneous capture of the status of the digital inputs, allowing it to be used as an absolut encoder interface. This functionality does not impact on the use of this module as an interface for simple digital inputs.

The 16bits¹ value relating to digital inputs can be acquired at the ladder program, executing the move of I(X) to a M memory, where X is the number of the first channel at the module DIM401 and it is used for the interface with the absolut encoder.

Example: Let's suppose a P7C¹ controller with two modules DIM401, where the first one is used only for simple digital inputs and the second will be used not only for interface with the 10 bits¹ absolut encoder, but also for simple digital inputs. The following picture presents a part of the ladder program for this context:



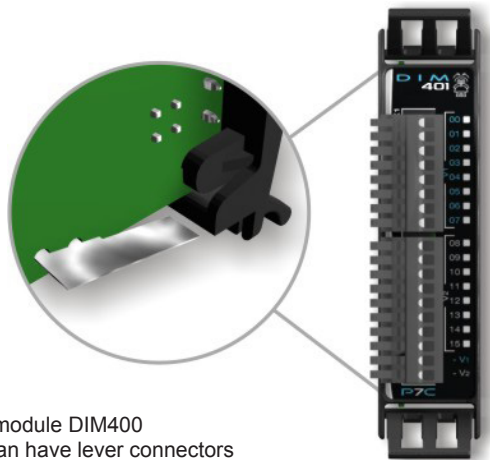
Ground Connector

There are two ground connectors at the module side, which are responsible for the contact with the main rack structure.



IMPORTANT: When handling the module, be careful to not hurt yourself with the ground connectors, because they have a sharp surface.

¹ - Check the Notes and Acronysms List at the beggining of this document



Compatible with the module DIM400
 Note: The modules can have lever connectors
 (for the new modules) or screw connectors.

Module addressing



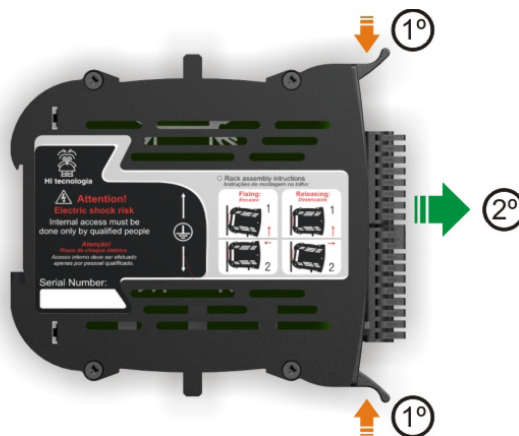
The modules DIM400/401 have not addressing configuration using hardware (strap¹/switch). It is provided automatically by the controller firmware when connected to the rack.

Removing the module from the rack



DIM400/401 modules CAN be replaced with the device turned on (Hot Swap¹).

To remove the module from the main rack, push the two locks, one against the other, to unlock the plastic frontal. At this moment, pull them in order to remove them from the rack.

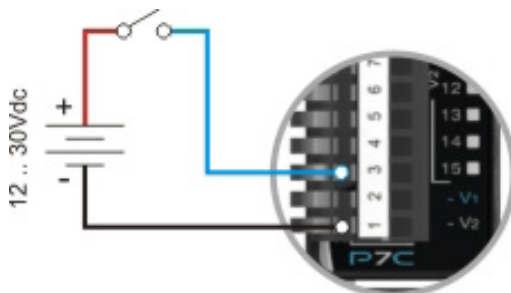


1º - Press the locks, one against the other, using the two hands (it is not necessary to use a lot of force for that, just the enough to unlock. Each lock needs be moved at +/- 3mm (as indicated at the picture).

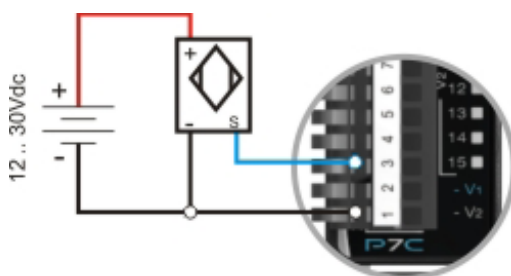
2º - With the locks pressed, pull them in order to disconnect the module from the rack (as indicated at the picture).

1 - Check the Notes and Acronyms List at the beginning of this document

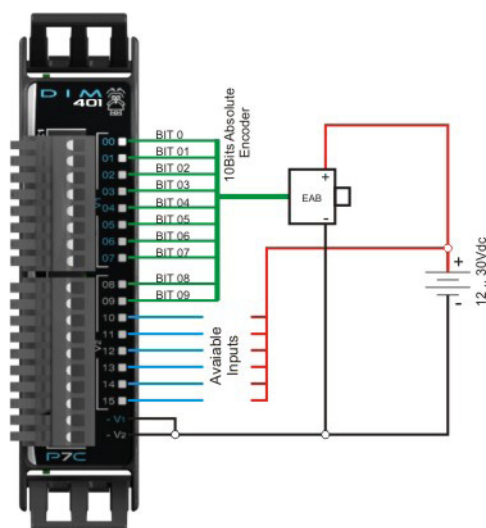
Utilisation example



Keys, stop switches, etc



3 wires sensors, optical, magnetic, capacitive, etc



Compatible with the module DIM400

Note: The modules can have lever connectors (for the new modules) or screw connectors.

Process interface leds operation



Status	Conf.	Condition	Diagnosis
On	I(0) to I(15)	There is voltage signal at the input	There is a valid minimal voltage level, present at the digital input.
Off	I(0) to I(15)	No voltage signal at the input	Inactive input signal; Device turned off; Module not operational:

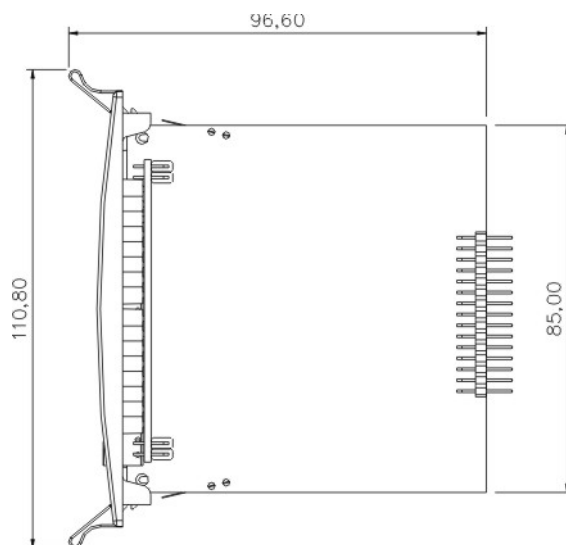
Compatible with the module DIM400

Note: The modules can have lever connectors (for the new modules) or screw connectors.

1 - Check the Notes and Acronyms List at the beginning of this document

DIM400/401

Dimensions (mm)



Product Part Number

Code	Identification
300.107.400.000	Module with 16 digital inputs channels (compatible with CPU300/301)
300.107.401.000	Module with 16 digital inputs channels (compatible with CPU301)

07

DOM450/451 Technical Specifications

Presentation

DOM450/451 are the P7C¹ digital output modules and provide to the user 16 digital input channels, PNP¹ type, totally independent, electrically isolated by opto-couplers¹, for signals from 12 to 24 Vdc (external supply) / 500 mA¹ maximum, short-circuit protection and individual leds to indicate the output status (on / off). Modules with automatic addressing, being allowed the simultaneous use of modules at P7C¹. Frontal connectors¹ of removable signals and wires connection using screws. Modules are easily inserted/removed from the rack.



Compatible with the module DOM450

Note: The modules can have lever connectors (for the new modules) or screw connectors.

Compatibility

The following table presents the CPU modules compatible with the modules used:

Module	P7C Controller	
	CPU300	CPU301
DOM450*	Yes	Yes
DOM451	No	Yes

(*) – It must not be used with controllers that have 2 expansion racks

¹ - Check the Notes and Acronyms List at the beginning of this document

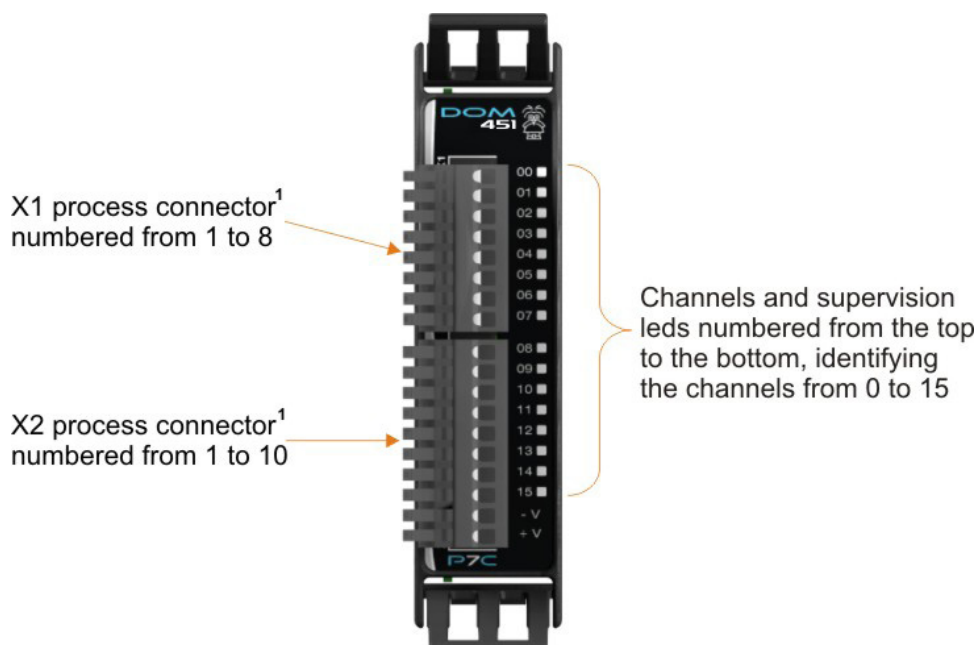
Technical Specification

Power Supply	5 Vdc (supplied by main rack)
Consumption	0,5 W
Operation temperature	0 to 60 °C
Storage temperature	-25 °C to 80 °C
Humidity	≤90% without condensation
Module weight	0,06 Kg approximately
Dimensions	85 (W) x 83 (H) x 27 (P) mm

Technical Data - Outputs

Output type	12 to 24 Vdc / PNP ¹
Maximum Frequency	500 Hz (it varies in function of scan time)
Isolation voltage	5 kV rms
Protection	Short-circuit protected
Maximum current by channel	500 mA ¹
Maximum voltage	24 Vdc

Process Interface



Compatible with the module DOM450

Note: The modules can have lever connectors (for the new modules) or screw connectors.

¹ - Check the Notes and Acronyms List at the beginning of this document

Connections

The modules DOM450/451 have two process interface connectors¹, identified as X1 (8 terminal blocks¹) and X2 (10 terminal blocks¹). These terminal blocks¹ are numbered as the following tables will show:

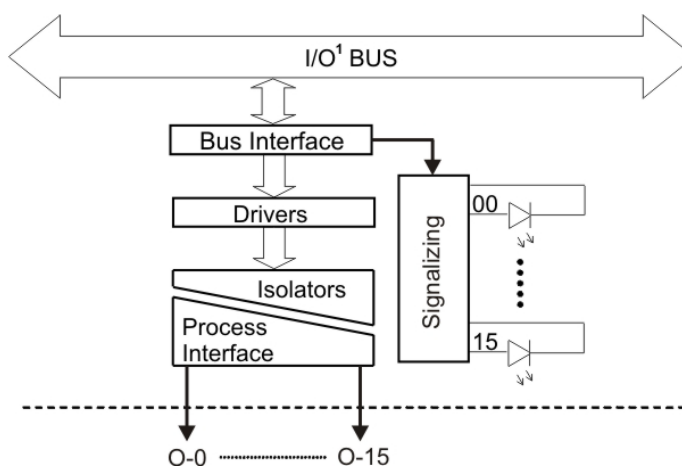
Terminal block ¹ X1	Signal
1	00 digital output channel
2	01 digital output channel
3	02 digital output channel
4	03 digital output channel
5	04 digital output channel
6	05 digital output channel
7	06 digital output channel
8	07 digital output channel

Terminal block ¹ X2	Signal
1	08 digital output channel
2	09 digital output channel
3	10 digital output channel
4	11 digital output channel
5	12 digital output channel
6	13 digital output channel
7	14 digital output channel
8	15 digital output channel
9	Digital outputs negative reference (-V)
10	Digital outputs negative reference (+V)



IMPORTANT: The negative references must be turned on at 0 Volt of the DC power supply in order to supply the process sensors. The positive reference must be connected into a voltage from 12 to 24 Vdc of the DC power supply used for supplying the process sensors and transmitters. If not connected to one of the references (negative, positive or both), the module execute its function.

Block Diagram



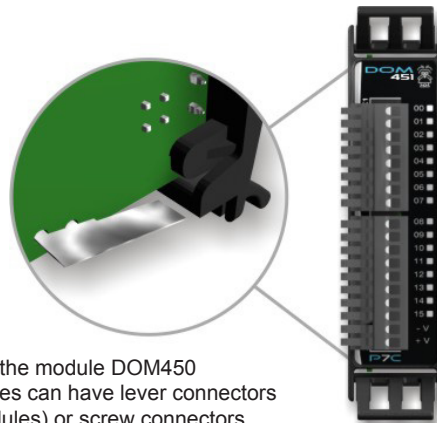
¹ - Check the Notes and Acronyms List at the beginning of this document

Ground Connector

There are two ground connectors at the module side, which are responsible for the contact with the main rack structure.



IMPORTANT: When handling the module, be careful to not hurt yourself with the ground connectors, because they have a sharp surface.



Compatible with the module DOM450
 Note: The modules can have lever connectors (for the new modules) or screw connectors.

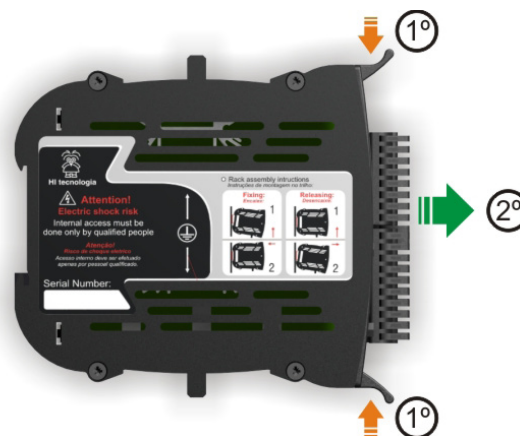
Module Addressing

The modules DOM450/451 have not addressing configuration using hardware (strap¹ / switch). It is provided automatically by the controller firmware when connected to the rack.

Removing the module from the rack

DOM450/451 modules **CAN** be replaced with the device turned on (Hot Swap¹).

To remove the module from the main rack push the two locks, one against the other, to unlock the plastic frontal. At this moment, pull them in order to remove them from the rack.

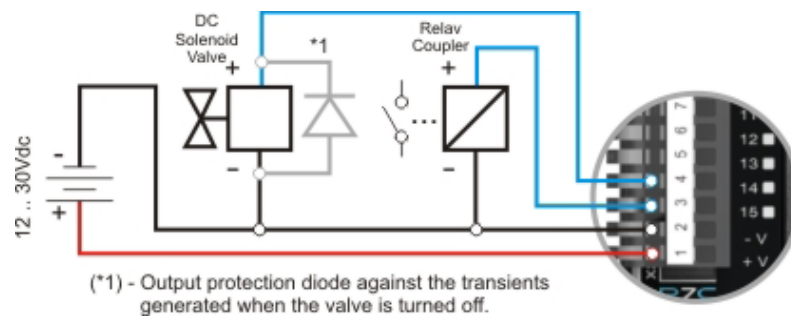


1° - Press the locks, one against the other, using the two hands (it is not necessary to use a lot of force for that, just the enough to unlock. Each lock needs be moved at +/- 3mm (as indicated at the picture).

2° - With the locks pressed, pull them in order to disconnect the module from the rack (as indicated at the picture).

1 - Check the Notes and Acronyms List at the beginning of this document

Utilisation examples



Process interface leds operation

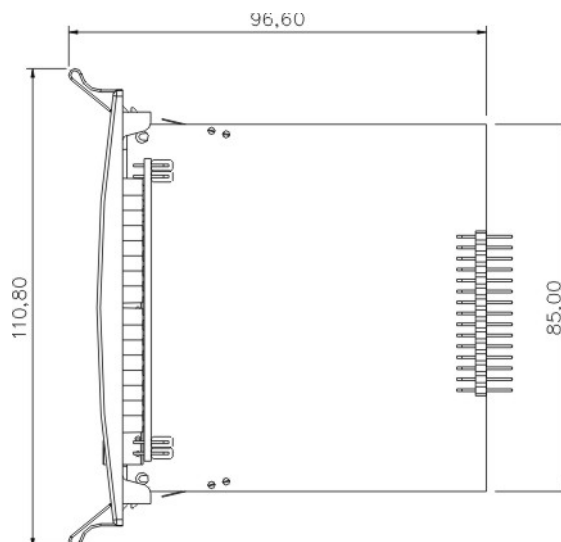


Status	Conf.	Condition	Diagnosis
On	O(0) to O(15)	There is voltage signal at the output (output on)	There is a valid minimal voltage level, present at the digital input. Note: the led signaling can keep active even if the output transistor be damaged
Off	O(0) to O(15)	No voltage signal at the output (output off)	Inactive input signal; Device turned off; Module not operational;

Compatible with the module DOM450

Note: The modules can have lever connectors (for the new modules) or screw connectors.

Dimensions (mm)



Product Part Number

Part Number	Identificaion
300.107.450.000	Module with 16 digital output channels (compatible with CPU300/301)
300.107.451.000	Module with 16 digital output channels (compatible with com CPU301)

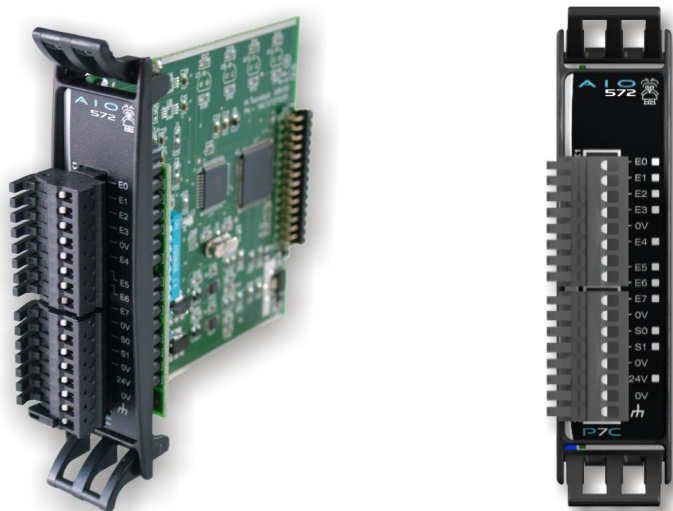
1 - Check the Notes and Acronysms List at the beggining of this document

08

AIO570/572 Technical Specifications

Presentation

AIO570/572 are the P7C¹ analog inputs and outputs modules and provide to the user 8 analog inputs channels of 10 bits¹ resolution and 2 analog outputs of 10 bits¹ resolution, with individual leds to indicate the status leds. Module with automatic addressing, being allowed the simultaneous use of modules at P7C¹



Compatible with the module AIO570

Note: The modules can have lever connectors (for the new modules) or screw connectors.

Compatibility

The following table presents the CPU modules compatible with the modules used:

Module	P7C Controller	
	CPU300	CPU301
AIO570*	Yes	Yes
AIO572	No	Yes

(*) – It must not be used with controllers that have 2 expansion racks.

¹ - Check the Notes and Acronyms List at the beginning of this document

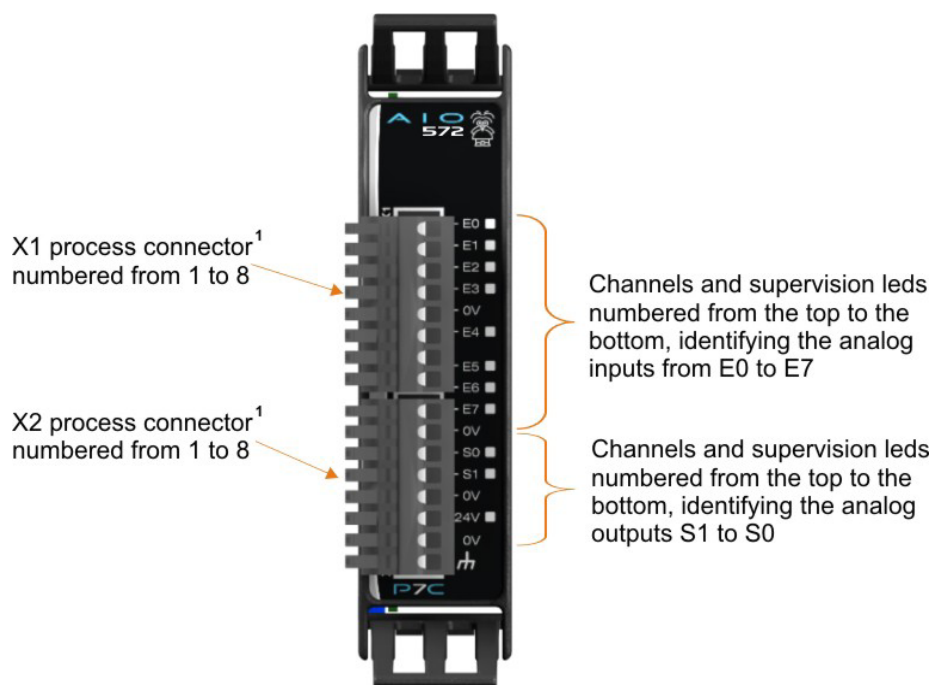
Technical Specification

Power Supply	5 Vdc (supplied by main rack)
Consumption	0,7 W
Operation Temperature	0 to 60 C°
Storage Temperature	-25 C° to 80 C°
Humidity	≤90% without condensation
Module weight	0,06 Kg approximately
Dimensions	85 (W) x 83 (H) x 27 (L) mm

Technical Data – Input / Output

Analog input	8 10 bits ¹ resolution channels with connection options of signals from 0 to 20 mA ¹ , 4 to 20 mA ¹ (impedance ¹ of 125Ω) and 0 to 10 Vdc (impedance ¹ of 10 KΩ)
Analog input protection	Overvoltage protection
Analog output	2 10 bits ¹ resolution channels for signals from 0 to 20 mA ¹ or 4 to 20 mA ¹ .
Analog output protection	Short-circuit protected

Process Interface



Compatible with the module AIO570

Note: The modules can have lever connectors (for the new modules) or screw connectors.

¹ - Check the Notes and Acronyms List at the beginning of this document

Connections

The modules AIO570/572 have two process interface connectors¹, identified as X1 (8 terminal blocks¹) and X2 (8 terminal blocks¹). These terminal blocks¹ are numbered as the following tables will show:

Terminal Connector ¹ X1	Signal
1	E0 analog input channel
2	E1 analog input channel
3	E2 analog input channel
4	E3 analog input channel
5	Analog inputs reference (0V)
6	E4 analog input channel
7	E5 analog input channel
8	E6 analog input channel

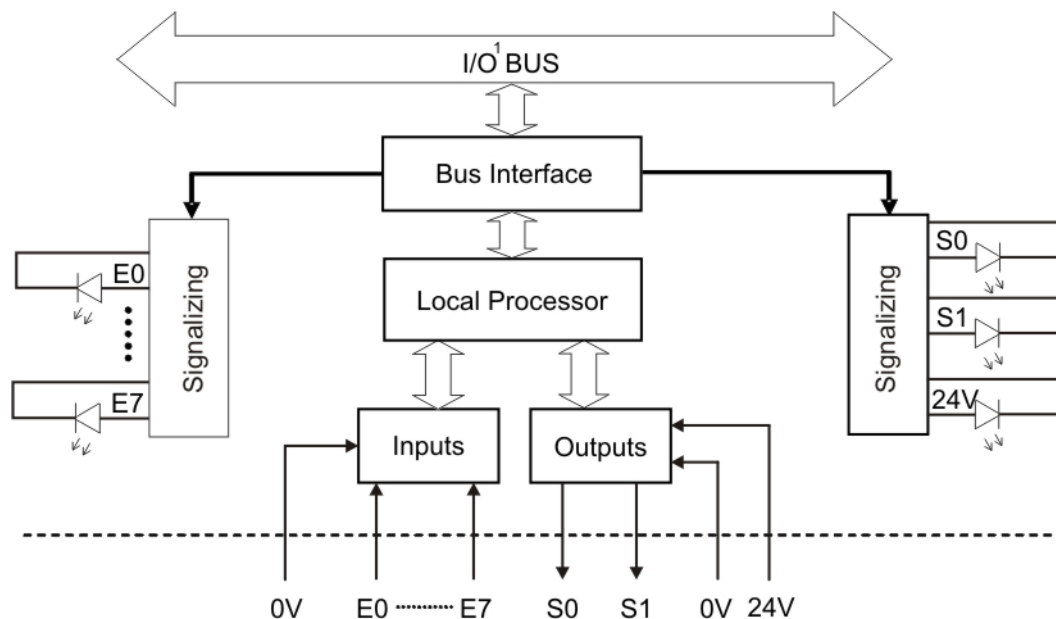
Terminal Connector ¹ X2	Signal
1	E7 analog input channel
2	Analog inputs reference (0V)
3	S0 analog output channel
4	S1 analog output channel
5	Analog outputs reference (0V)
6	Analog outputs power supply
7	Analog outputs power supply reference
8	Cable shielding



IMPORTANT: The analog outputs need an external 24Vdc power supply, that can be connected at the terminal blocks¹ X2-6 (24Vdc) and X2-7 (0V).
For analog signals, use cables with shielding, connecting them to the terminal block¹ X2-8.

¹ - Check the Notes and Acronyms List at the beginning of this document

Block Diagram

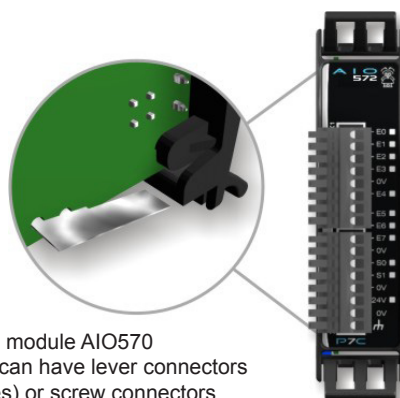


Ground connector

There are two ground connectors at the module side, which are responsible for the contact with the main rack structure.



IMPORTANT: When handling the module, be careful to not hurt yourself with the ground connectors, because they have a sharp surface.



Compatible with the module AIO570
 Note: The modules can have lever connectors (for the new modules) or screw connectors.

Module Addressing

The modules AIO570/572 have not addressing configuration using hardware (strap¹ / switch). It is provided automatically by the controller firmware when connected to the rack.

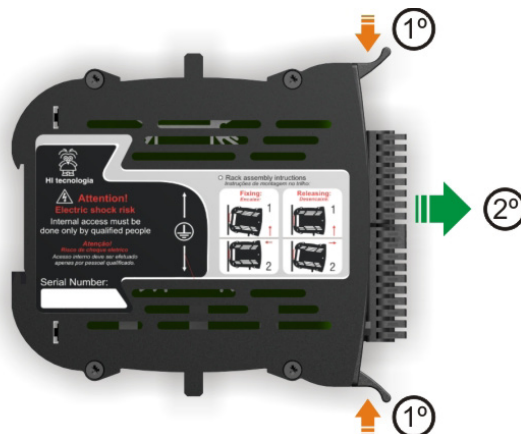
¹ - Check the Notes and Acronyms List at the beginning of this document



Removing the module from the rack

AIO570/572 modules CAN be replaced with the device turned on (Hot Swap¹).

To remove the module from the main rack, push the two locks, one against the other, to unlock the plastic frontal. At this moment, pull them in order to remove them from the rack.



1º - Press the locks, one against the other, using the two hands (it is not necessary to use a lot of force for that, just the enough to unlock. Each lock needs be moved at +/- 3mm (as indicated at the picture).

2º - With the locks pressed, pull them in order to disconnect the module from the rack (as indicated at the picture).

Configurations

The analog inputs E4, E5, E6 and E7 are configurable by using a set of keys available on a Dip Switch¹ (SW1). The access to the keys is at the module component face. The others configurations of the module are executed using an specific software (SPDSW¹).

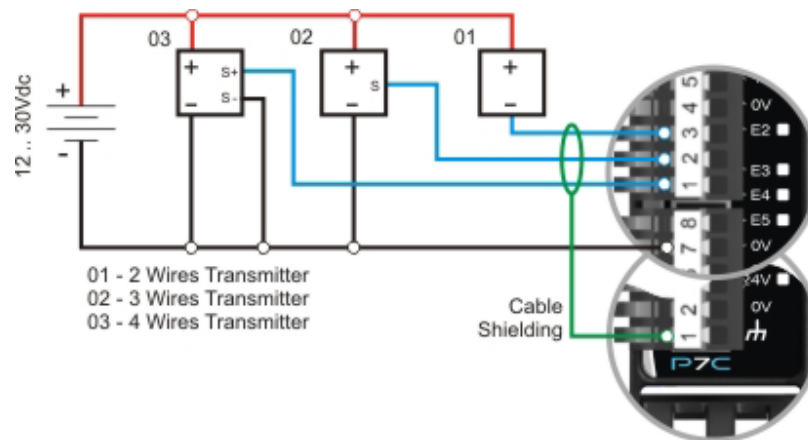
Analog Input	DIP8 SW1	Current	Voltage
E4	1	ON	OFF
	2	OFF	ON
E5	3	ON	OFF
	4	OFF	ON
E6	5	ON	OFF
	6	OFF	ON
E7	7	ON	OFF
	8	OFF	ON



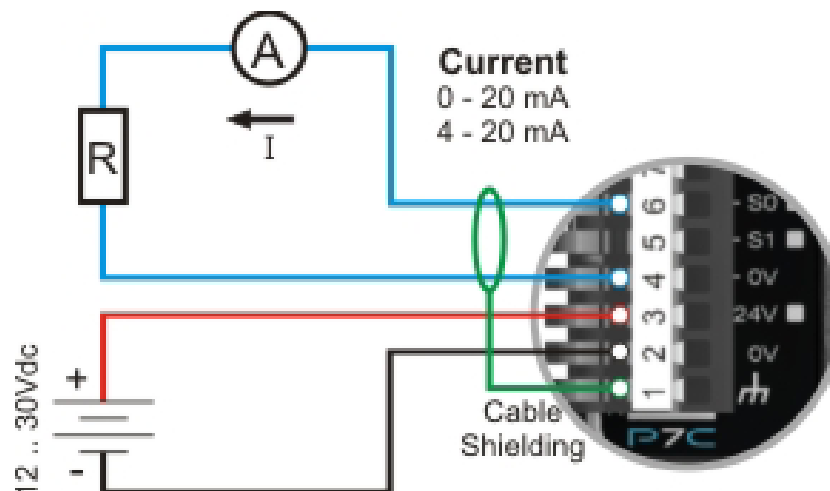
IMPORTANT: The analog inputs E0, E1, E2 and E3 are not configurable by the user. Their original configuration (operate with current) comes from the manufacturer. The current offset 0 to 20mA¹ or 4 to 20mA¹ is configured using SPDSW¹ from the version 2.x.xx on.

¹ - Check the Notes and Acronyms List at the beginning of this document

Analog inputs utilisation examples



Analog outputs utilisation examples



Compatible with the module AIO570

Note: The modules can have lever connectors (for the new modules) or screw connectors.

Operation from 0 to 10V

The analog input can operate on a range from 0 to 10V. In this case, the configuration from 0 to 20mA¹ must be kept and also closed the configuration strap associated to the output.

Strap J3 – Related to S0 output

Strap J4 – Related to S1 output

Others voltage configurations

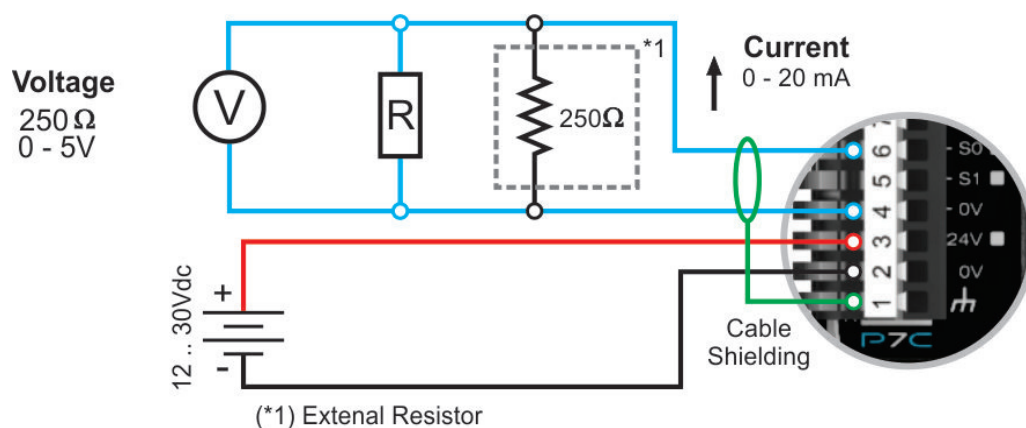
It is possible to obtain other voltage ranges by using an external resistor, as the following example shows:

- By using a 250Ω external resistor it is possible to obtain a range from 0 to 5V.

ATTENTION: To use an external resistor, keep the straps J3 and J4 open.

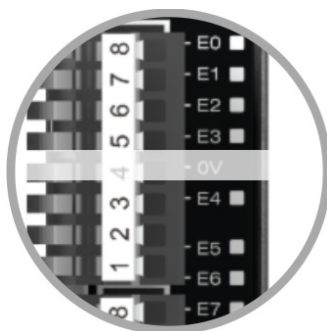


¹ - Check the Notes and Acronyms List at the beginning of this document



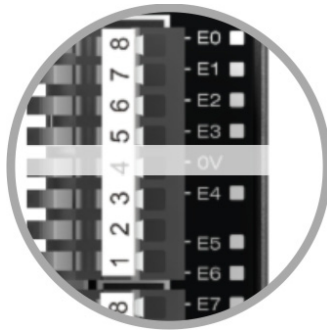
Process interface leds operation

Analog inputs, configured for current at the range from 4 to 20 mA¹



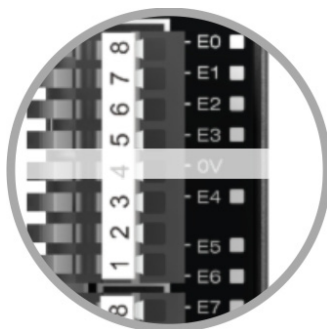
Leds	Status	Condition	Diagnosis
E(0) E(7)	to On	There is current signal at the input	
E(0) E(7)	to Off	There is no current signal at the input or voltage smaller than the range configured	Open channel, equipment turned off or parameterization fail of the analog module

Analog inputs, configured for current at the range from 0 to 20 mA¹



Leds	Status	Condition	Diagnosis
E(0) E(7)	to On	There is current signal at the input	
E(0) E(7)	to Off	There is no current signal at the input	Equipment turned off or parameterization fail of the analog module

Analog inputs, configured for voltage at the range from 2 to 10 V



Leds	Status	Condition	Diagnosis
E(4) E(7)	and On	*Note1	
E(4) E(7)	and Off	Inoperational channel	Open channel, equipment turned off or parameterization fail of the analog module

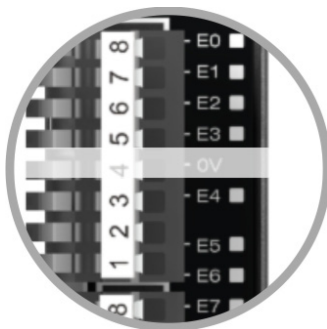
*Note1: When the channel off-set (Current/Voltage) is zero, the condition "led on" indicates that the channel is operational.

Compatible with the module AIO570

Note: The modules can have lever connectors (for the new modules) or screw connectors.

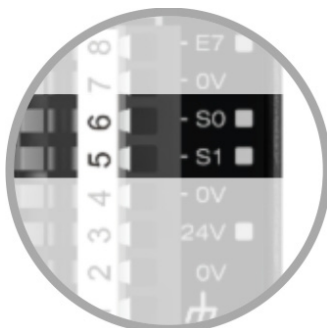
1 - Check the Notes and Acronyms List at the beginning of this document

AIO570/572

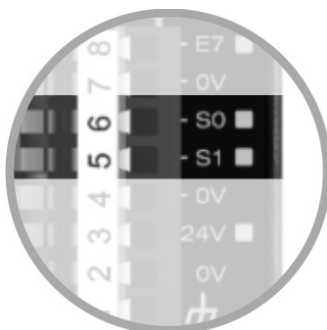
Analog inputs, configured for voltage at the range from 0 to 10 V


Leds	Status	Condition	Diagnosis
E(4) and E(7)	On	*Note1	
E(4) and E(7)	Off	Inoperational channel	Equipment turned off or parameterization fail of the analog module

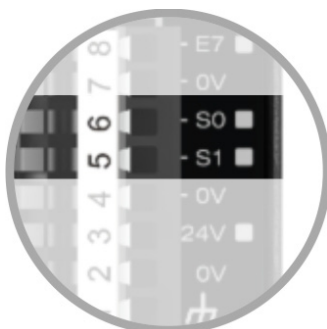
*Note1: When the channel off-set (Current/Voltage) is zero, the condition "led on" indicates that the channel is operational.

Analog Outputs, configured for current at the range from 4 to 20 mA¹


Leds	Status	Condition	Diagnosis
S(0) and S(1)	On	Detected connection with the process	
S(0) and S(1)	Off	No connection with the process	Equipment turned off or parameterization fail of the analog module

Analog Outputs, configured for current at the range from 0 to 20 mA¹


Leds	Status	Condition	Diagnosis
S(0) e S(1)	On	Detected connection with the process	
S(0) e S(1)	Off	No connection with the process	Equipment turned off or parameterization fail of the analog module

Analog Outputs, configured for voltage at the range from 0 to 10 V


Leds	Status	Condition	Diagnosis
S(0) and S(1)	On	Continuously ON, not depending on the output (if it is connected to the process or not)	
S(0) and S(1)	Off	No 24V supply voltage	Equipment turned off or not operational module

Compatible with the module AIO570

Note: The modules can have lever connectors (for the new modules) or screw connectors.

1 - Check the Notes and Acronyms List at the beginning of this document

AIO570/572

Module 24Vdc supply voltage

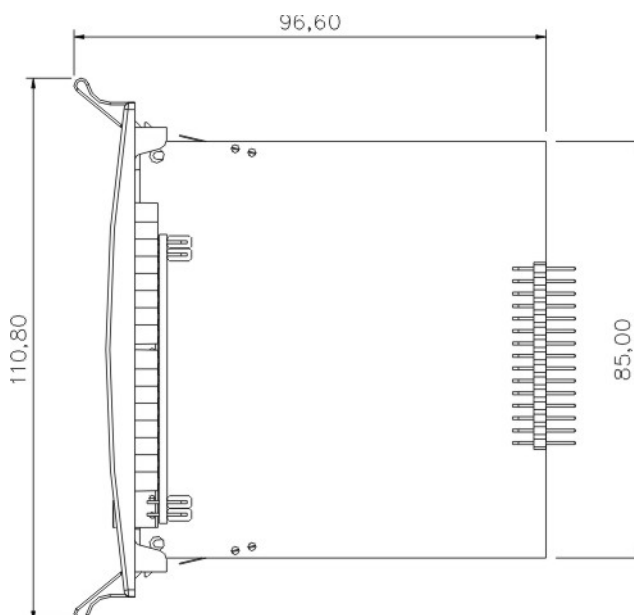


Leds	Status	Condition	Diagnosis
24V	On	Supply voltage available	
24V	Off		Equipment turned off or not operational module
24V	Blinking	No supply voltage	

Compatible with the module AIO570

Note: The modules can have lever connectors (for the new modules) or screw connectors.

Dimensions (mm)



Product Part Number

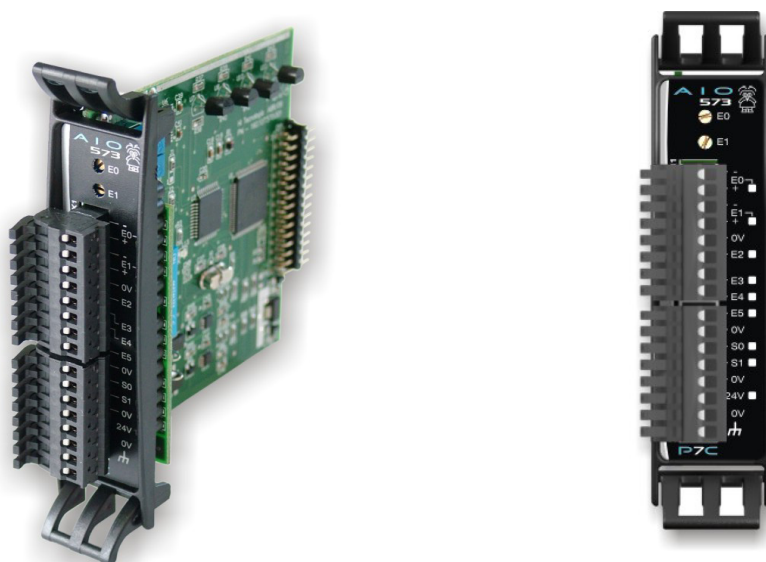
Part Number	Identification
300.107.570.000	Module with 8 analog inputs and 2 analog outputs (compatible with CPU300/301)
300.107.572.000	Module with 8 analog inputs and 2 analog outputs (compatible with CPU301)

09

AIO571/573 Technical Specifications

Presentation

AIO571/573 are the P7C¹ analog inputs, outputs and pt100 channels modules, providing to the user 4 analog inputs channels of 10 bits¹ resolution (configurable for current or voltage), 2 analog outputs of 10 bits¹ resolution and 2 channels with inputs for pt100 (3 wires), all them with individual leds to indicate the status leds. Module with automatic addressing, being allowed the simultaneous use of modules at P7C¹.



Compatible with the module AIO571

Note: The modules can have lever connectors (for the new modules) or screw connectors.

Compatibility

The following table presents the CPU modules compatible with the modules used:

Module	P7C Controller	
	CPU300	CPU301
AIO571*	Yes	Yes
AIO573	No	Yes

(*) – It must not be used with controllers that have 2 expansion racks

¹ - Check the Notes and Acronyms List at the beginning of this document

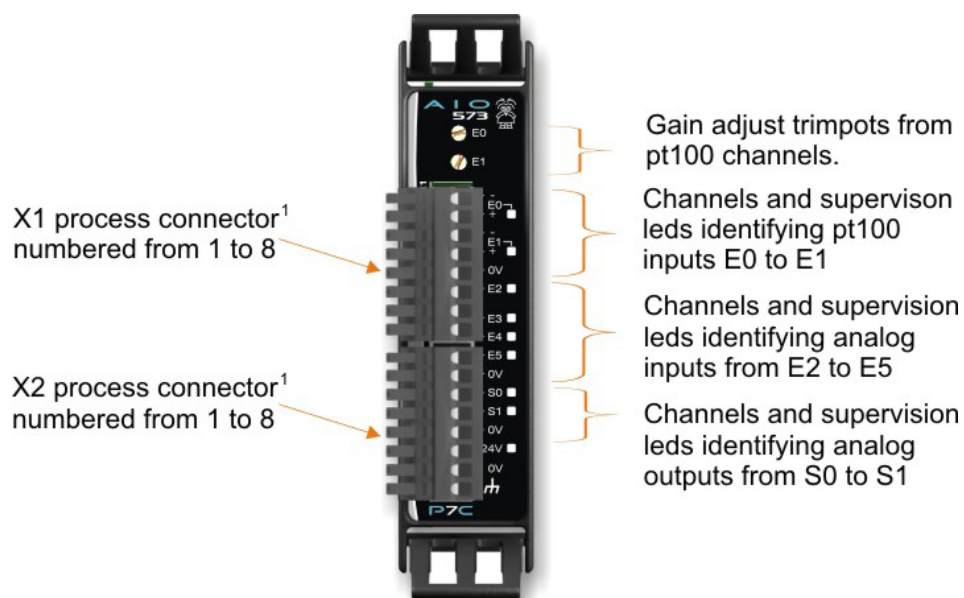
Technical Specifications

Power Supply	5 Vdc (supplied by main rack)
Consumption	0,7 W
Operation temperature	0 to 60 °C
Storage temperature	-25 °C to 80 °C
Humidity	≤90% without condensation
Module weight	0,06 Kg approximately
Dimensions	85 (W) x 83 (H) x 27 (L) mm

Technical Data – Input / Output

PT100 input	2 pt100 (3 wires) sensor channels, with the standard operation range of -10 ... +150 °C. Reading maximum error 0,5% full scale
Analog input	4 10 bits ¹ resolution channels with option of connections with signals from 0 to 20 mA ¹ , 4 a 20 mA ¹ (impedance ¹ of 125 Ω) and 0 to 10 Vdc (impedance ¹ of 10 KΩ)
Analog input protection	Against overvoltage
Analog output	2 10 bits ¹ resolution channels for signals from 0 to 20 mA ¹ or 4 to 20 mA ¹
Analog output protection	Short-circuit protected

Process Interface



Compatible with the module AIO571

Note: The modules can have lever connectors (for the new modules) or screw connectors.

¹ - Check the Notes and Acronyms List at the beginning of this document

Connections

The modules AIO571/573 have two process interface connectors¹, identified as X1 (8 terminal blocks¹) and X2 (8 terminal blocks¹). These terminal blocks¹ are numbered as the following tables will show:

X1 Terminal Block ¹	Signal
1	E0 temperature sensor negative input
2	E0 temperature sensor positive input
3	E1 temperature sensor negative input
4	E1 temperature sensor positive input
5	Analog inputs reference (0V)
6	E2 analog input channel
7	E3 analog input channel
8	E4 analog input channel

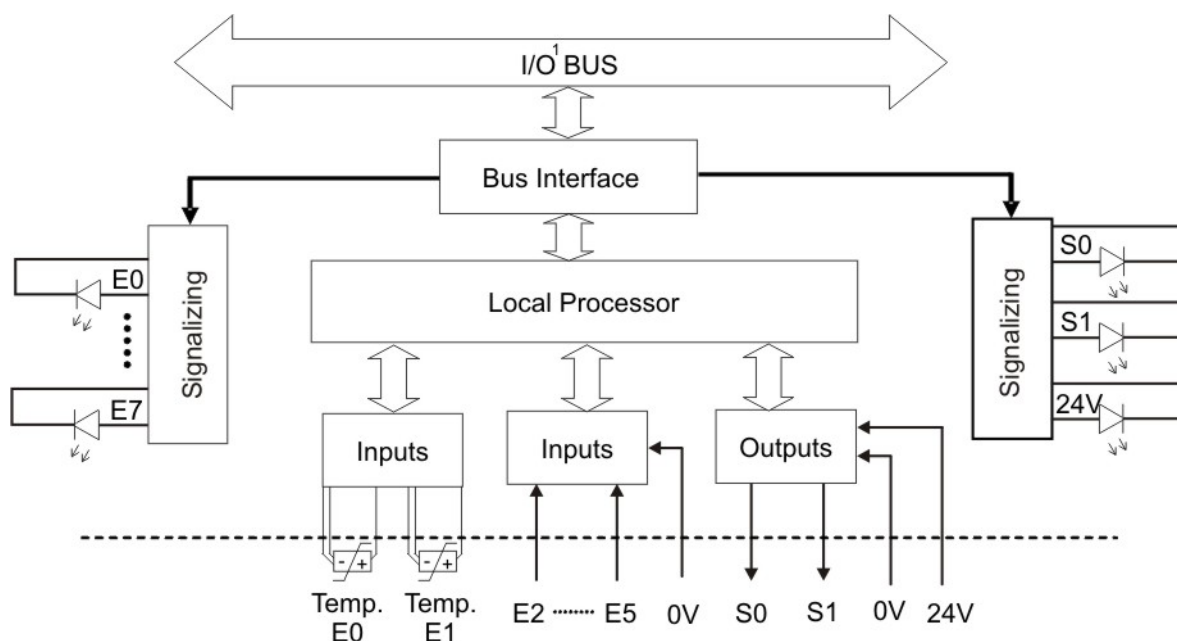
X2 Terminal Block ¹	Signal
1	E5 analog input channel
2	Analog inputs reference (0V)
3	S0 analog output channel
4	S0 analog output channel
5	Analog outputs reference (0V)
6	Analog outputs supply
7	Analog outputs power supply reference
8	Cable shielding



IMPORTANT: The analog outputs need an external 24Vdc power supply, that can be connected at the terminal blocks¹ X2-6 (24vdc) and X2-7 (0V).
For analog signals, use cables with shielding, connecting them to the terminal block¹ X2-8.

¹ - Check the Notes and Acronyms List at the beginning of this document

Block Diagram

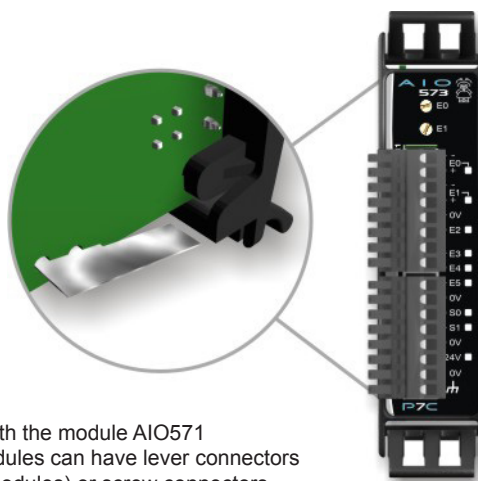


Ground connector

There are two ground connectors at the module side, which are responsible for the contact with the main rack structure.



IMPORTANT: When handling the module, be careful to not hurt yourself with the ground connectors, because they have a sharp surface.



Compatible with the module AIO571
 Note: The modules can have lever connectors
 (for the new modules) or screw connectors.

Module Addressing

The modules AIO571/573 have not addressing configuration using hardware (strap¹ / switch). It is provided automatically by the controller firmware when connected to the rack.

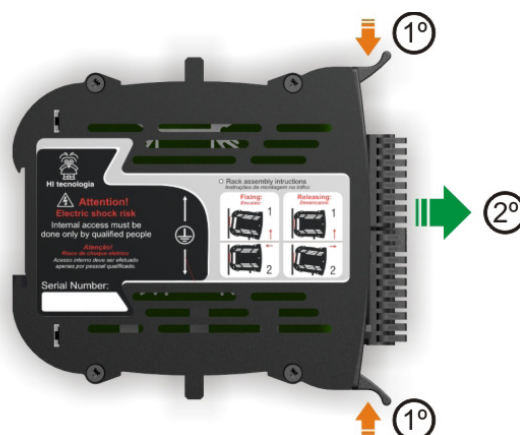
¹ - Check the Notes and Acronyms List at the beginning of this document



Removing the module from the rack

AIO571/573 modules CAN be replaced with the device turned on (Hot Swap¹).

To remove the module from the main rack, push the two locks, one against the other, to unlock the plastic frontal. At this moment, pull them in order to remove them from the rack.



1º - Press the locks, one against the other, using the two hands (it is not necessary to use a lot of force for that, just the enough to unlock. Each lock needs be moved at +/- 3mm (as indicated at the picture).

2º - With the locks pressed, pull them in order to disconnect the module from the rack (as indicated at the picture).

Configurations

The analog inputs E2, E3, E4 and E5 are configurable by using a keys set available on a Dip Switch¹ (SW1). The access to the keys is at the module component face. The others configurations of the module are executed using an specific software (SPDSW¹).

Analog Input	DIP8 SW1	Current	Voltage
E2	1	ON	OFF
	2	OFF	ON
E3	3	ON	OFF
	4	OFF	ON
E4	5	ON	OFF
	6	OFF	ON
E5	7	ON	OFF
	8	OFF	ON

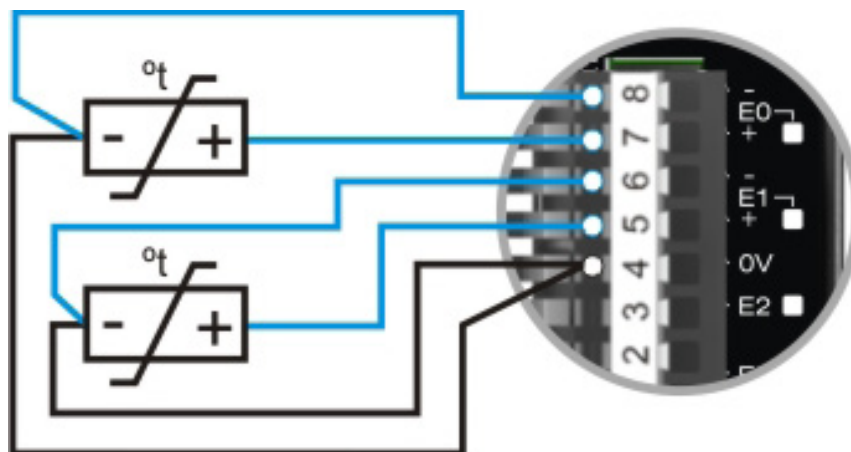


IMPORTANT: The current offset 0 to 20mA¹ or 4 to 20mA¹ is configured using SPDSW¹ from the version 2.x.xx on

¹ - Check the Notes and Acronyms List at the beginning of this document

Pt100 Inputs utilisation examples

The inputs E1 and E0 connection scheme, when connected to the sensor pt100 (3 wires), will be exemplified as it follows:

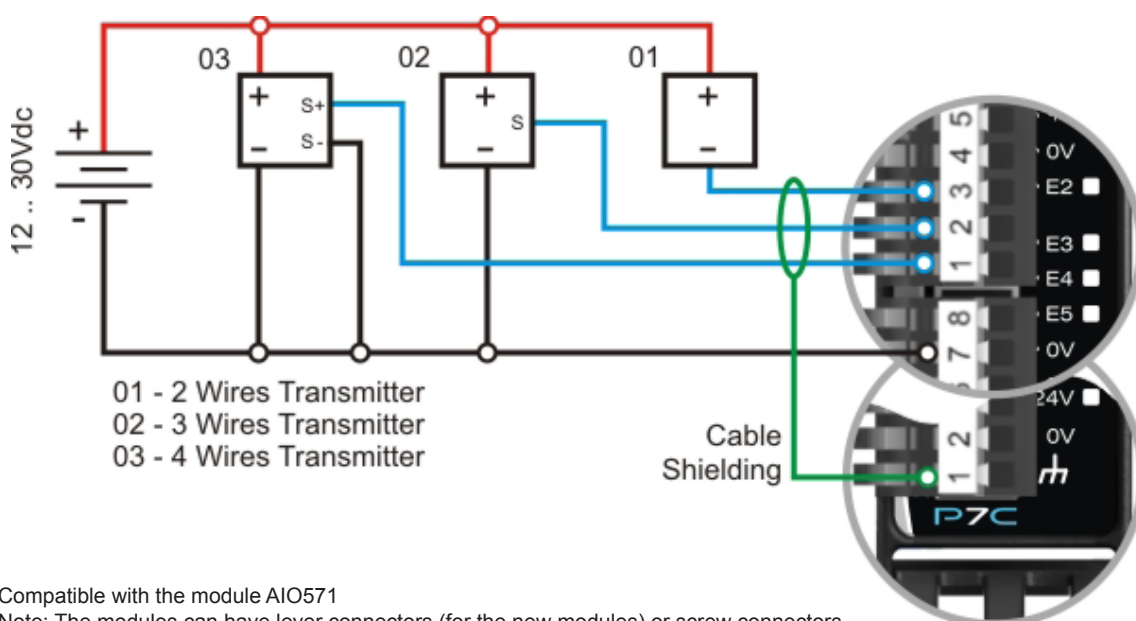


In this case, the PLC¹ will be able to read the temperature at channels E0 and E1. The standard range is -10 to +150°C, and full scale can be calibrated from -120 to +250°C. The reading maximum error is 0,5% full scale. The Pt100 second negative input must be connected to signal 0V (X1-5).

The temperature values provided by the module for the Ladder program are set in Celsius degrees x 10, thus:

Standard Temp. [°C]	Value obtained from Ladder program	Description
-10 to +150	-100 to 1500	-100 = -10.0°C 1500 = 150.0°C

Utilisation examples of analog inputs of instrumentation



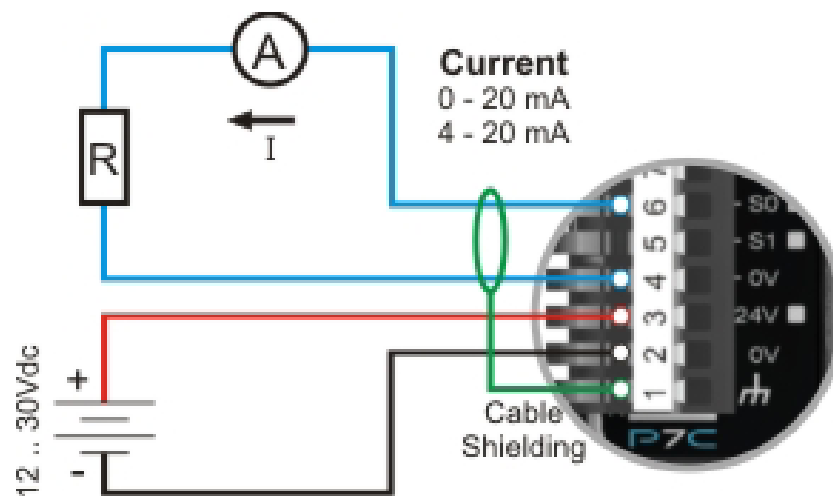
Compatible with the module AIO571

Note: The modules can have lever connectors (for the new modules) or screw connectors.

1 - Check the Notes and Acronyms List at the beginning of this document

AIO571/573

Utilisation examples of analog outputs of instrumentation



Operation from 0 to 10V

The analog input can operate on a range from 0 to 10V. In this case, the configuration from 0 to 20mA¹ must be kept and it also must be closed the configuration strap associated to the output.

Strap J3 – Related to S0 output

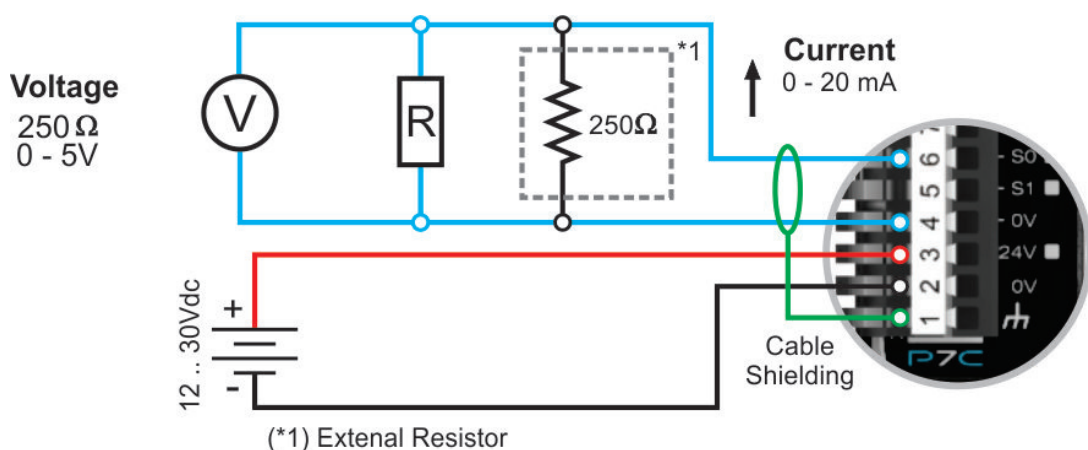
Strap J4 – Related to S1 output

Others voltage configurations

It is possible to obtain other voltage ranges by using an external resistor, as the following example shows:

- By using a 250Ω external resistor it is possible to obtain a range from 0 to 5V.

ATTENTION: To use an external resistor, keep straps J3 and J4 open.



Compatible with the module AIO571

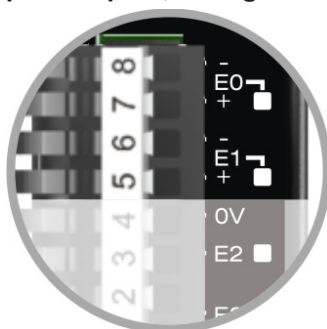
Note: The modules can have lever connectors (for the new modules) or screw connectors.

1 - Check the Notes and Acronyms List at the beginning of this document

AIO571/573

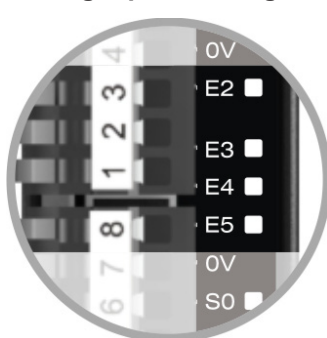
Process interface leds operation

pt100 inputs, configured at the range from -10 to +150°C



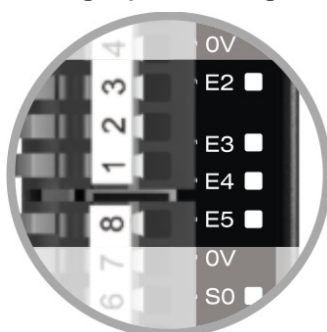
Leds	Status	Condition	Diagnosis
E(0 and 1)	On	pt100 sensor connected	Operational channel
E(0 and 1)	Off	pt100 sensor negative input disconnected	Sensor fail, disconnected, equipment turned off or analog module parameterization fail

Analog inputs, configured for current at the range from 4 to 20 mA¹



Leds	Status	Condition	Diagnosis
E(2 and 5)	On	There is current signal at the input	Operational channel
E(2 and 5)	Off	There is no current signal at the input or current smaller than the range configured	Open channel, equipment turned off or parameterization fail of the analog module

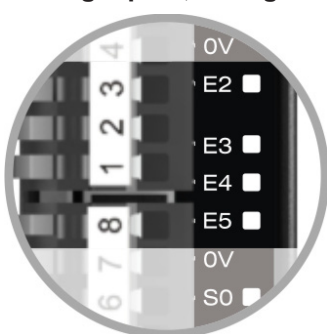
Analog inputs, configured for current at the range from 0 to 20 mA¹



Leds	Status	Condition	Diagnosis
E(2) E(5)	to On	*Note1	Operational channel
E(2) E(5)	to Off	Inoperational channel	Equipment turned off or parameterization fail of the analog module

*Note1: When the channel off-set (Current/Voltage) is zero, the condition "led on" indicates that the channel is operational.

Analog inputs, configured for voltage at the range from 2 to 10V



Leds	Status	Condition	Diagnosis
E(2 and 5)	On	There is voltage signal at the input	
E(2 and 5)	Off	There is no voltage signal at the input or voltage smaller than the range configured	Open channel, equipment turned off or parameterization fail of the analog module

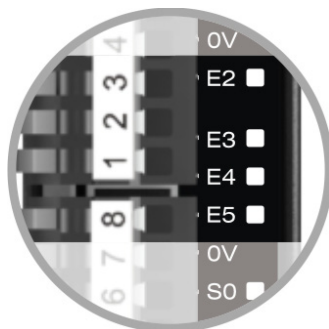
Compatible with the module AIO571

Note: The modules can have lever connectors (for the new modules) or screw connectors.

1 - Check the Notes and Acronyms List at the beginning of this document

AIO571/573

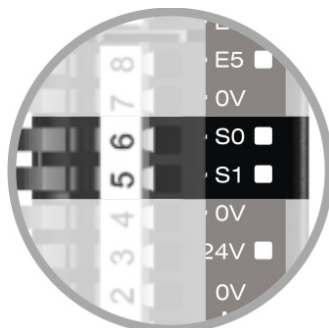
Analog inputs, configured for voltage at the range from 0 to 10 V



Leds	Status	Condition	Diagnosis
E(2) E(5)	to On	*Note1	
E(2) E(5)	to Off	Inoperational channel	Equipment turned off or parameterization fail of the analog module

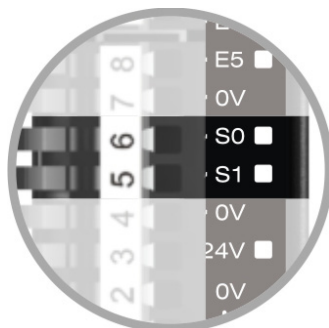
*Note1: When the channel off-set (Current/Voltage) is zero, the condition "led on" indicates that the channel is operational.

Analog outputs, configured for current at the range from 4 to 20 mA¹



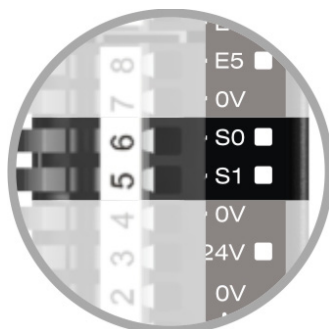
Leds	Status	Condition	Diagnosis
S (0 and 1)	On	Detected connection with the process	
S (0 and 1)	Off	No connection with the process	Equipment turned off or parameterization fail of the analog module

Analog outputs, configured for current at the range from 0 to 20 mA¹



Leds	Status	Condition	Diagnosis
S (0 and 1)	On	Detected connection with the process	
S (0 and 1)	Off	No connection with the process	Equipment turned off or parameterization fail of the analog module

Analog outputs, configured for voltage at the range from 0 to 10 V



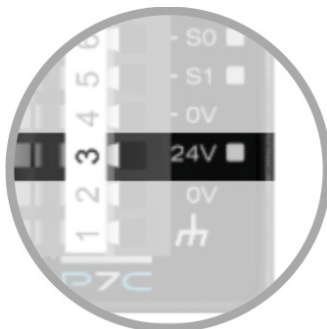
Leds	Status	Condition	Diagnosis
S (0 and 1)	On	Continuously ON, not depending on the output (if it is connected to the process or not)	
S (0 and 1)	Off	No 24V power supply	Equipment turned off or module not operational

Compatible with the module AIO571

Note: The modules can have lever connectors (for the new modules) or screw connectors.

¹ - Check the Notes and Acronyms List at the beginning of this document

24Vdc module power supply

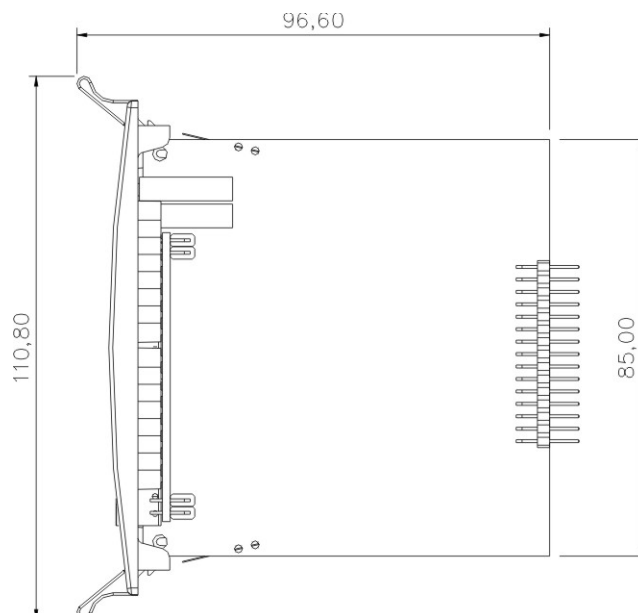


Leds	Status	Condition	Diagnosis
24V	On	There is analog output power supply	
24V	Off		Equipment turned off or module not operational
24V	Blinking	There is no analog output power supply	

Compatible with the module AIO571

Note: The modules can have lever connectors (for the new modules) or screw connectors.

Dimensions (mm)



Product Part Number

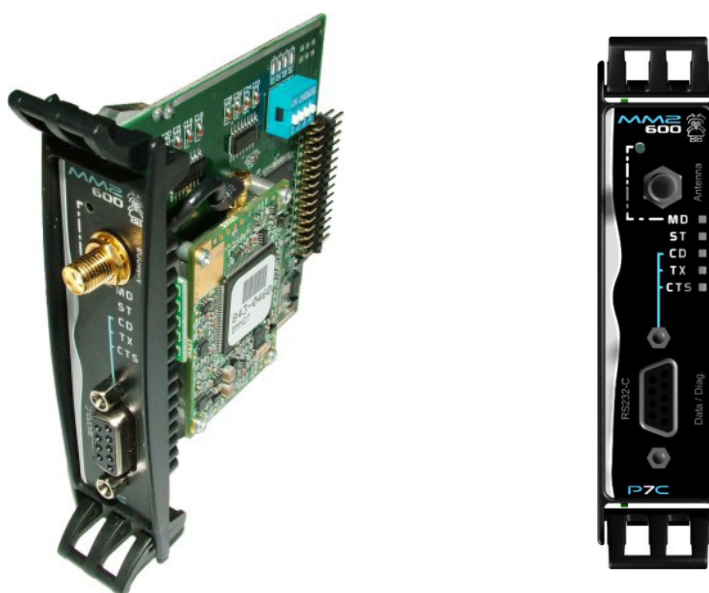
Part Number	Identification
300.107.571.000	Module with 2 pt100 (3 wires) inputs, 4 analog inputs and 2 analog outputs (compatible with CPU300/301)
300.107.573.000	Module with 2 pt100 (3 wires) inputs, 4 analog inputs and 2 analog outputs (compatible with CPU301)

10

MM2600 Technical Specifications

Presentation

MM2600 is the P7C¹ module with frequency hopping technology, operating on a range from 902 to 928MHz, with programmable power, on the range from 5mW to 1000mW. This module has automatic addressing, being allowed the simultaneous use of several modules at the same equipment. It has, at its frontal panel, one connector for external antenna, 2 RS232-C¹ serial channels (A and B) for data and diagnosis and leds to indicate the status of the operation.



Technical Specification

Power Supply	5 Vdc (supplied by main rack)
Consumption	1,2 W
Operation Temperature	0 to 60 °C
Storage Temperature	-25 °C to 80 °C
Humidity	≤90% without condensation
Module weight	0,06 Kg approximately
Dimensions	85 (W) x 83 (H) x 27 (P) mm

Technical Data – Radio Module

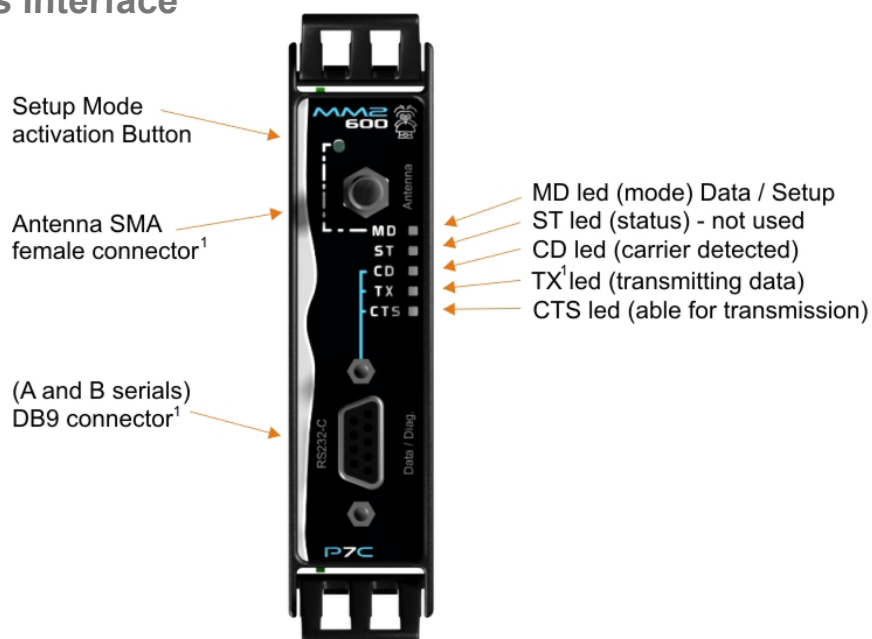
Modulation	Spread Spectrum GFSK 120 or 170 Kbps
Frequency	902 – 928 MHz with configurable sub-ranges enabling/blocking.
Power	5mW to 1 W
Maximum reach	60 miles (96 Km) with clear view
Operation mode	Point to Point, Point to Multipoint and TDMA

¹ - Check the Notes and Acronyms List at the beginning of this document

Serial channels	Data channel
	Diagnosis channel
Baud rate	1200 to 115 Kbauds (if up to 38400 it's not necessary the flow control)
Transmission current, maximum power with 100% duty cycle	635 mA ¹
Reception current	135 mA ¹
Maintenance current	19 mA ¹

The radio module has an internal data buffer of 512 bytes. When the application protocol limits the number of received/sent data, in each communication transaction smaller than this value (512 bytes), the radio can operate with a baudrate between 1200 and 115000 without needing a flow control using hardware. If not so, the maximum baud rate must be limited in 38400. SCP-HI¹ and Modbus-RTU¹ protocols allow programming the communication rate (baud rate) at all the range allowed by the radio.

Process Interface



Connections

Serial configuration (Data / Diagnosis)

MM2600 module has one DB9 connector¹ female.

DB9	Data	Diagnosis	Direction	Description	Note
1	CD		Output	Carrier Detect	
2	TX ¹		Output	Transmit Data	SERIAL [A]
3	RX ¹		Input	Receive Data	SERIAL [A]
4	DTR		Input	Data Terminal Ready	
5	GND ¹	GND ¹	-	0 Volt	
6		DTD	Output	Diag Transmit Data	SERIAL [B]
7	RTS		Input	Request To Send	
8	CTS		Output	Clear To Send	
9		DRD	Input	Diag Receive Data	SERIAL [B]

¹ - Check the Notes and Acronyms List at the beginning of this document

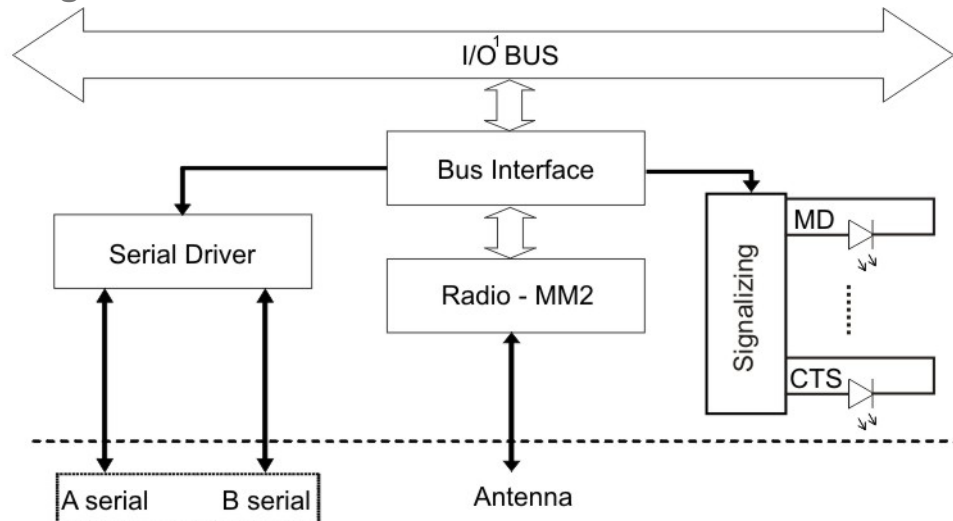
Protocols

The radio operates with any serial protocol available



IMPORTANT: The radio MM2600 has a maximum transmission power of 1000 mW. It is recommended that the transmission antenna be kept away from people, at least, 23cm, in order to attend the FCC RF limits.

Block Diagram

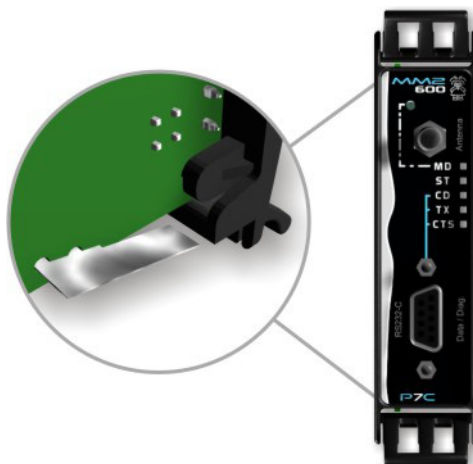


Ground Connector

There are two ground connectors at the module side, which are responsible for the contact with the main rack structure.



IMPORTANT: When handling the module, be careful to not hurt yourself with the ground connectors, because they have a sharp surface.



Module Addressing

The module MM2600 has not addressing configuration using hardware (strap¹ / switch). It is provided automatically by the controller firmware when connected to the rack.



¹ - Check the Notes and Acronyms List at the beginning of this document

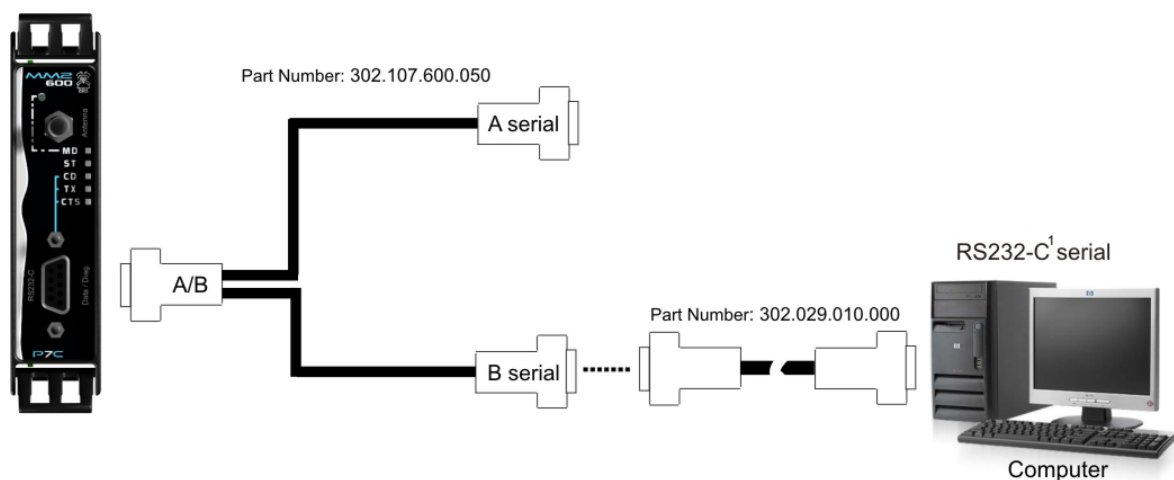
Radio Operation Configuration

Software

MM2600 has a setup mode that allows the access to all the radio programming parameters. To access the setup mode, open a data terminal (ex: Windows hyperterminal), configure the terminal for a baudrate operation of 19200, 8 bits¹, without parity, and 1 stop bit and after activate the terminal software connection.

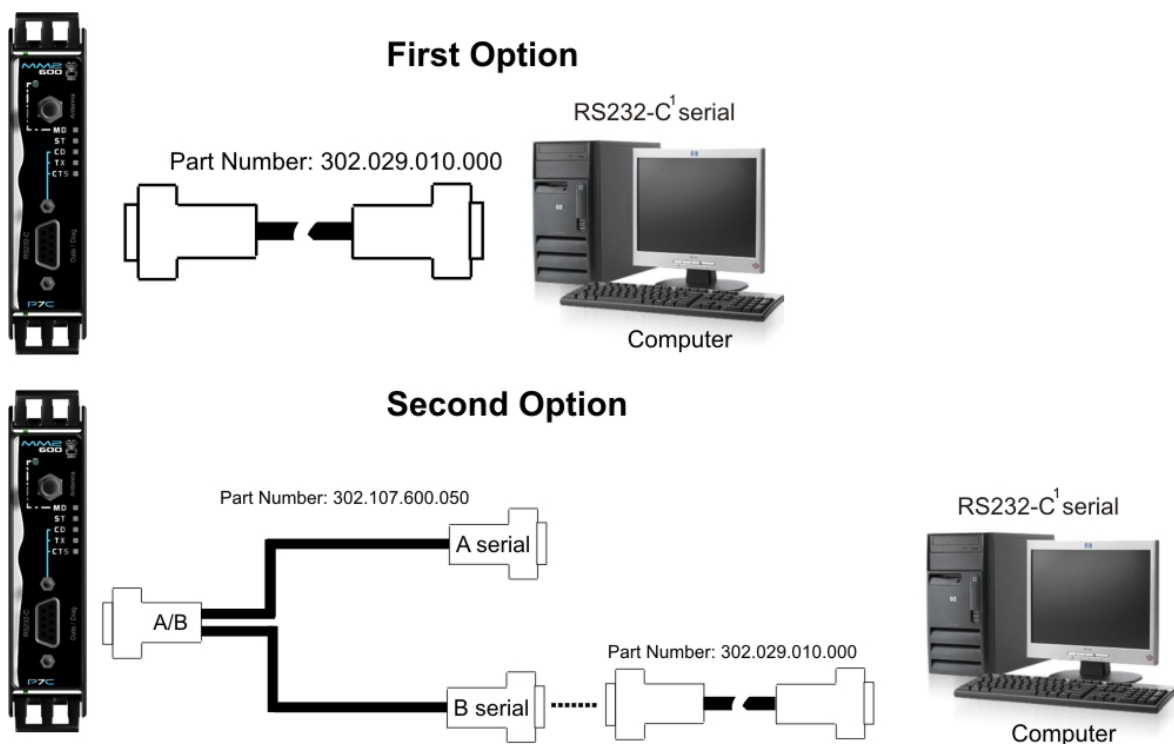
Connection through DIAGNOSIS channel

The access through a diagnosis channel can be executed through an Y adaptor cable and one data cable. Make the connection as indicated at the picture. At this moment, if the radio diagnosis channel is enabled at the terminal software screen, a sequence of characters not organized will be shown. If the channel is disabled, any character will be shown.



Connection through DATA channel

The access through a data channel can be executed in two ways: direct or using an Y cable, as the picture shows:



1 - Check the Notes and Acronyms List at the beginning of this document

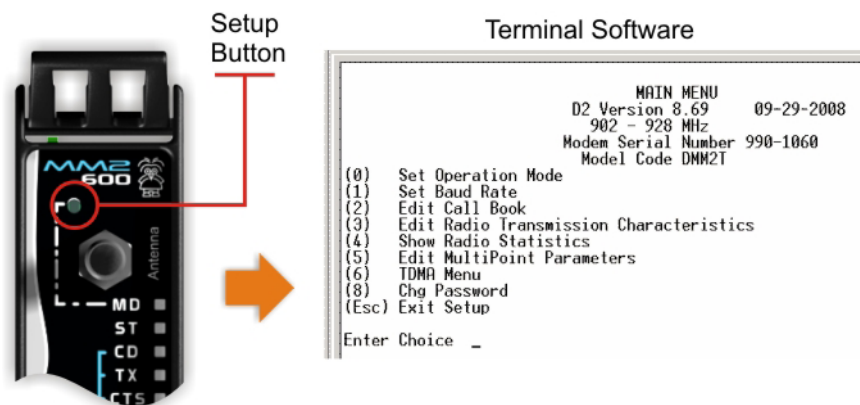


The cable Raio FreeWave – PC (302.029.010.000) does not provide the flow control signals RTS and CTS. The signals are connected each other through jumpers at the cables end.

Accessing the radio setup menu

Manual activation

With the terminal open (as the item Software describes) and the communication cable connected, push the setup button, placed at the top of the frontal panel. The led (MD) will be shown, indicating that the radio is on the setup mode. On the terminal software screen it will be presented a menu of configuration options of the radio parameters.



Activation by remote command

When connected to a diagnosis channel, another way to open the setup menu is typing SHIFT + U at the computer's keyboard. Note that in this option the Led (MD) is not activated.

Note: The activation using a remote command does not work through a data channel.

Navigation - (Menu)

The menu navigation is provided by the numbers or letters in brackets associatead to actions. The return to the screens is made using the key ESC, and to leave the Setup Mode, push ESC a few times and the led (MD) will be é turned off, indicating that the radio is on the operation mode again.

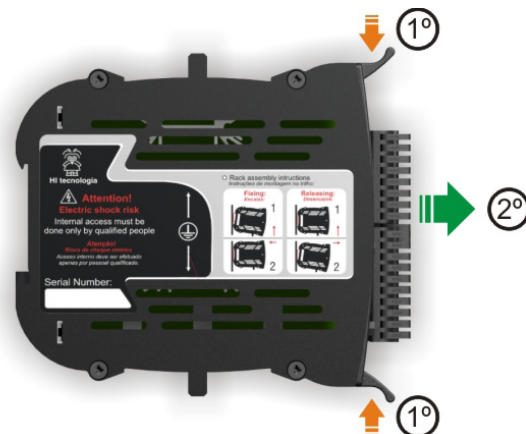
For more information about the radio programming, check the Software Note named "PNS0002700", available at HI Tecnologia's website.



Removing the module from the rack

MM2600 modules CAN be replaced with the device turned on (Hot Swap¹).

To remove the module from the main rack, push the two locks, one against the other, to unlock the plastic frontal. At this moment, pull them in order to remove them from the rack.



1º - Press the locks, one against the other, using the two hands (it is not necessary to use a lot of force for that, just the enough to unlock. Each lock needs be moved at +/- 3mm (as indicated at the picture).

2º - With the locks pressed, pull them in order to disconnect the module from the rack (as indicated at the picture).



ANATEL Certification

ANATEL stamp and 506 resolution



"Este equipamento opera em caráter secundário, isto é, não tem direito à proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário."

Where is placed the registration number of Anatel?

This number is placed at on the module, as indicated at the following picture:

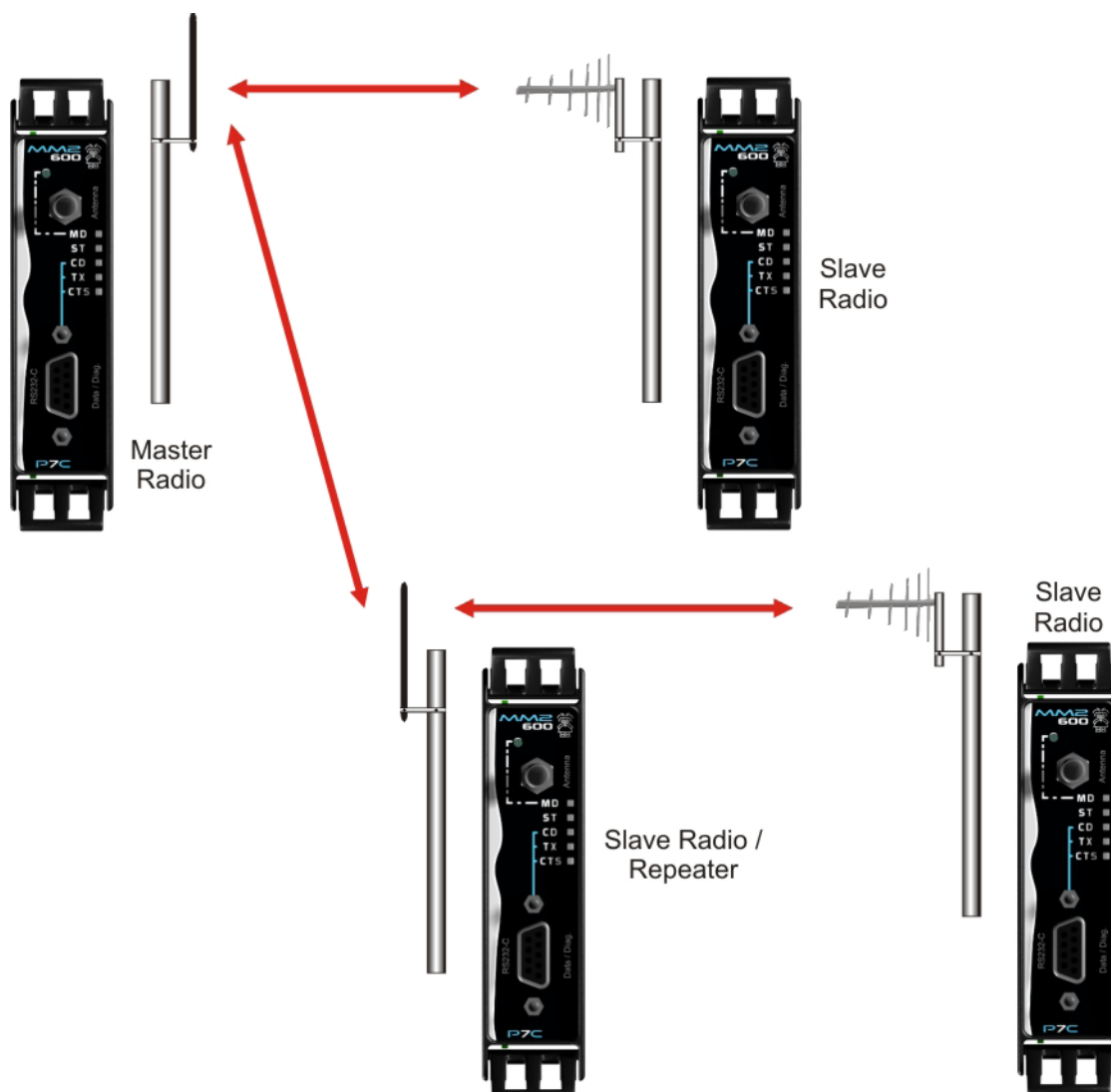


Utilisation examples

The following example shows the most common connection: master x slave on a point to point connection.



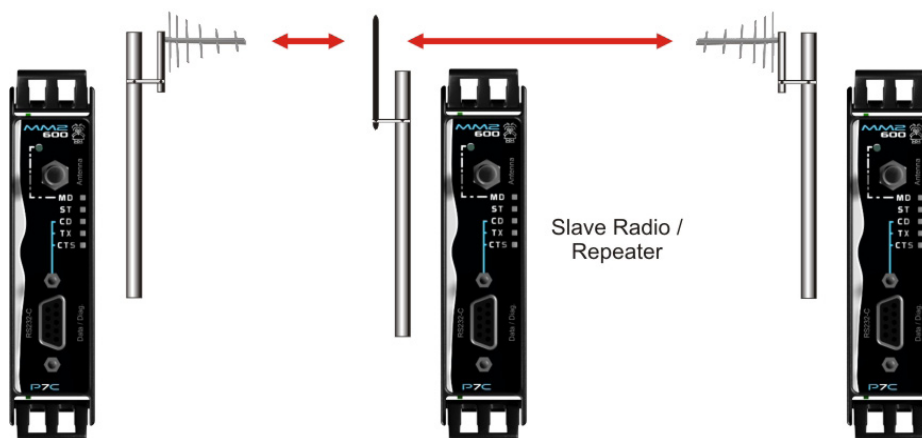
The next example shows an standard point to multipoint network:



1 - Check the Notes and Acronyms List at the beginning of this document

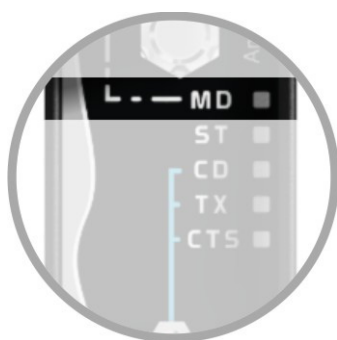
MM2600

The next example shows the configuration using a repeater. It must be placed at the highest point of the obstacle between two communication radios (a place that emphasizes the master connection with the slave).



Process interface leds operation

MD led (Mode)



Leds	Condition	Note
On	Active radio setup mode	In this condition, using a serial terminal application, it is possible to view and change the radio operation parameters
Off	Active radio data transference mode	In this condition, the radio is able to Exchange application data

ST Led Status



Leds	Condition	Note
On	-	
Off	Normal condition	Led not used at the module firm-ware current version

CD led (Carrier Detect)

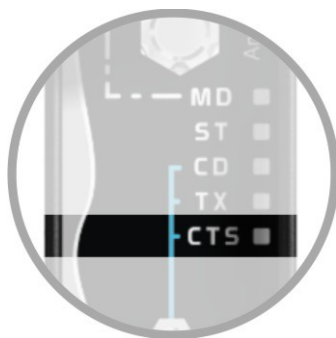


Leds	Condition	Obs.
On	Indicates that radio has active link	In this condition, the radio is able to receive data
Off	Indicates that radio has no active link (porter not detected)	

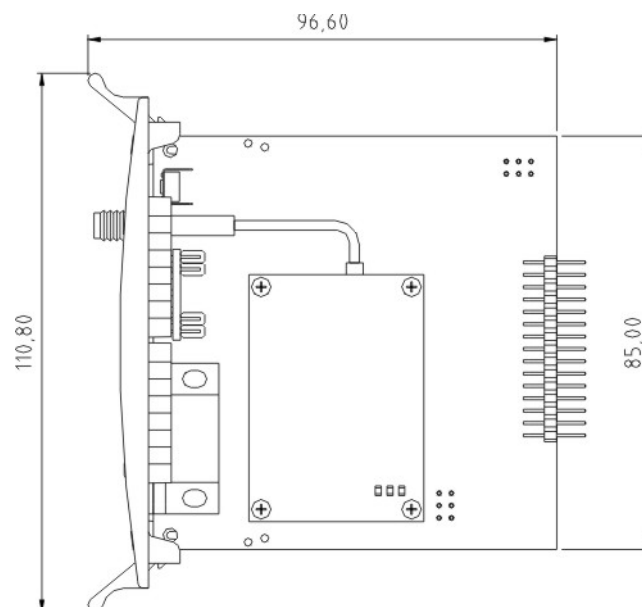
1 - Check the Notes and Acronyms List at the beginning of this document

TX¹ led (Transmit)


Leds	Condition	Note
On	Indicates that the radio is transmitting data	
Off	Indicates that the radio is not transmitting data	

CTS leds (Clear To Send)


Leds	Condition	Note
On	Indicates that the radio is able to receive new data that will be transmitted	
Off	Indicates that the radio is not able to receive new data that will be transmitted	

Dimensions (mm)

Product Part Number

Code	Identification
300.107.600.000	Radio module 900MHz / 1W

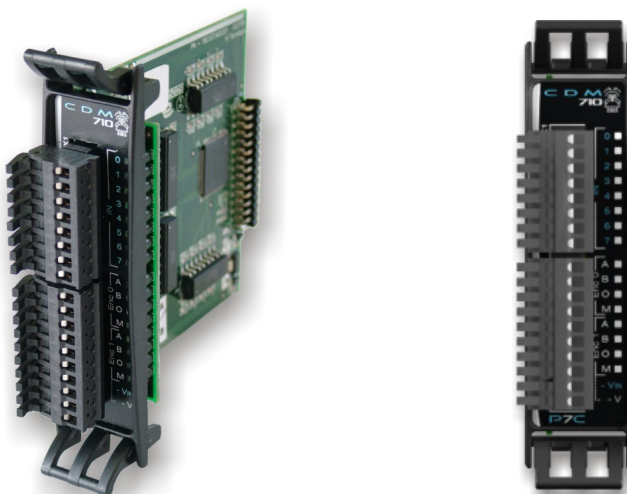
1 - Check the Notes and Acronyms List at the beginning of this document

11

CDM710 Technical Specifications

Presentation

CDM710 is the P7C¹ interface module for input channels and counters (simple and quadrature), providing 2 configurable counter channels, (simple and incremental encoder¹), digital inputs, electrically isolated by opto-couplers¹ for signals from 12 to 30 Vdc PNP¹ type, individual leds to indicate the input status (on/off). ENC 0/1 signals are able to operate as encoder¹/counter or as digital input. Module with automatic addressing, being allowed the simultaneous use of modules at P7C¹ and also Hot Swap¹. Frontal connector¹ of removable signals and wires connection using screws. Modules are easily inserted/removed from the rack.



Note: The modules can have lever connectors (for the new modules) or screw connectors.

Technical Specification

Power Supply	5 Vdc (supplied by main rack)
Consumption	0,5 W
Operation Temperature	0 to 60 °C
Storage Temperature	-25 °C to 80 °C
Humidity	≤90% without condensation
Module weight	0,06 Kg approximately
Dimensions	85 (W) x 83 (H) x 27 (L) mm

Technical Data – Digital Input

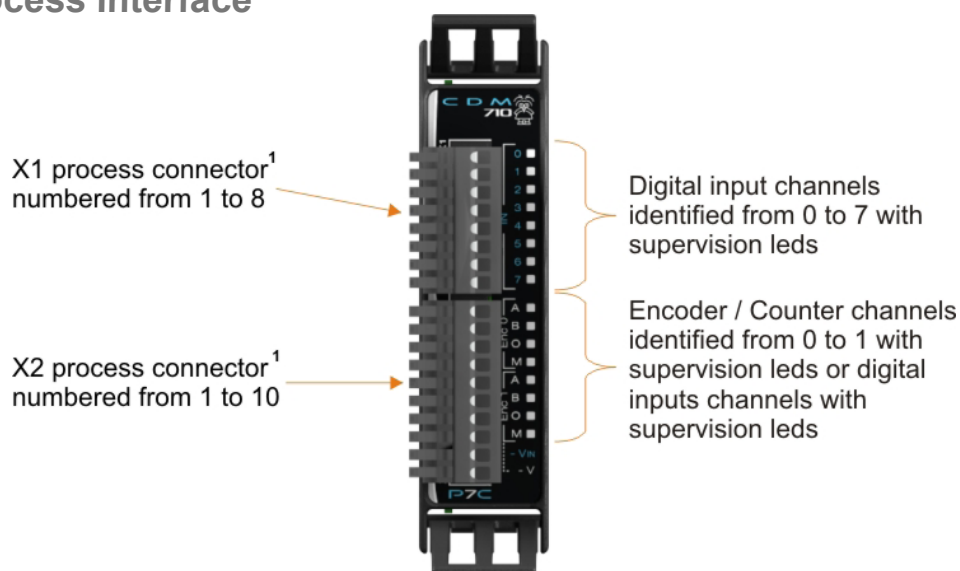
Input type	12 to 30 Vdc / PNP ¹
Maximum frequency	200 Hz (it varies in function of scan time)
Isolation voltage	5 kV rms
Protection	Against polarity inversion

¹ - Check the Notes and Acronyms List at the beginning of this document

Technical Data – Input (Encoder / Counter)

Input type	12 to 30 Vdc / PNP ¹
Maximum frequency	3500 Hz
Isolation voltage	5 kV rms
Protection	Against polarity inversion

Process Interface



Note: The modules can have lever connectors (for the new modules) or screw connectors.

Connections

The module CDM710 has two process interface connectors¹, which are identified as X1 (8 terminal blocks¹) and X2 (10 terminal blocks¹). These terminal blocks¹ are numbered as the following tables will show:

X1 Terminal Connector ¹	Signal
1	0 digital input channel
2	1 digital input channel
3	2 digital input channel
4	3 digital input channel
5	4 digital input channel
6	5 digital input channel
7	6 digital input channel
8	7 digital input channel

X2 Terminal Connector ¹	Signal
1	ENC0 channel [A] input or digital input channel 8
2	ENC0 channel [B] input or digital input channel 9
3	ENC0 channel [O] input or digital input channel 10
4	ENC0 channel [M] input or digital input channel 11
5	ENC1 channel [A] input or digital input channel 12
6	ENC1 channel [B] input or digital input channel 13

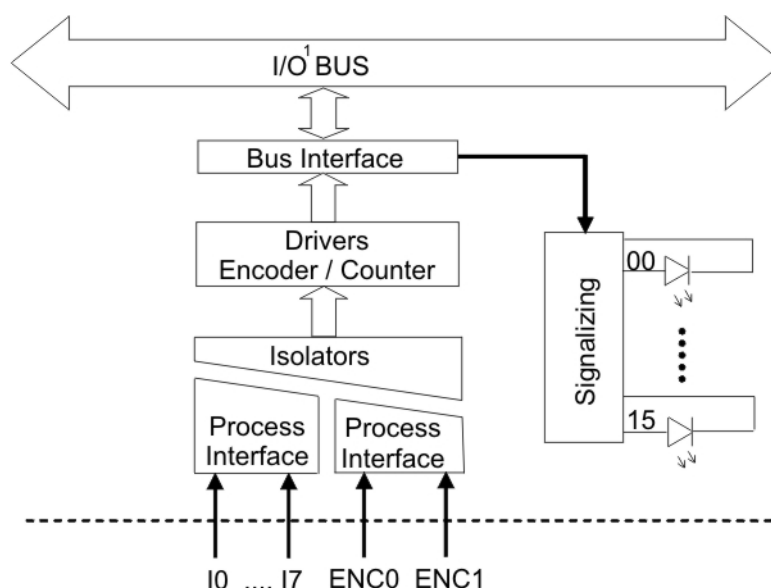
¹ - Check the Notes and Acronyms List at the beginning of this document

7	ENC1 channel [O] input or digital input channel 14
8	ENC1 channel [M] input or digital input channel 15
9	I0-I7 inputs reference (-VIN)
10	ENC 0 / ENC 1 (-V) channels reference



IMPORTANT: The negative reference $-VIN$ must be connected to 0 Volts of the DC power supply in use, in order to supply the process sensors connected to the digital inputs from 0 to 7. The negative reference $-V$ must be connected to 0 Volts of the DC power supply in use, in order to supply pulse sensors or encoders¹ connected to ENC 0 and ENC 1 inputs. If not connected to one of the references, the module will not work completely.

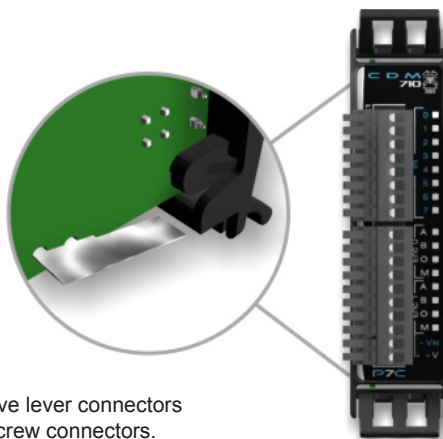
Block Diagram



Ground connector

There are two ground connectors at the module side, which are responsible for the contact with the main rack structure.

IMPORTANT: When handling the module, be careful to not hurt yourself with the ground connectors, because they have a sharp surface.



Note: The modules can have lever connectors (for the new modules) or screw connectors.

¹ - Check the Notes and Acronyms List at the beginning of this document



Module Addressing

The module CDM710 has not addressing configuration using hardware (strap¹ / switch). It is provided automatically by the controller firmware when connected to the rack

ENC 0 / ENC 1 functionalities – Encoder / Faster Counter

ENC 0 and ENC 1 channels are configurable and can operate as encoder¹ or as fast counter. The operation mode is defined according to the input status [M] of the channel. The following tables will present the possible configurations of the channels.

Encoder Mode

Channel	Input	Description
ENC 0	[A]	Encoder ¹ A signal
	[B]	Encoder ¹ B signal
	[O]	Synchronism signal
	[M]	OFF = Defines the operation mode as encoder ¹
ENC 1	[A]	Encoder ¹ A signal
	[B]	Encoder ¹ B signal
	[O]	Synchronism signal
	[M]	OFF = Defines the operation mode as encoder ¹

Fast Counter Mode

Channel	Input	Description
ENC 0	[A]	Pulse signal that will be counted
	[B]	Count enabling mode (Check the configurations table)
	[O]	Count enabling mode (Check the configurations table)
	[M]	ON = It defines the operation mode as counter
ENC 1	[A]	Pulse signal that will be counted
	[B]	Count enabling mode (Check the configurations table)
	[O]	Count enabling mode (Check the configurations table)
	[M]	ON = It defines the operation mode as counter

Fast counter mode configurations

The operation as fast counter provides 3 configuration with different functionalities, as indicated at the table below.

Config.	[O]	[B]	Functionality
1	OFF	OFF	Standard pulses counter
2	OFF	X1	Counter with (Enable / Disable) by status
-	ON	OFF	Not used
3	ON	X2	Counter with (Enable / Disable) – Trigger mode

Note:

[ON] = Active input, connected to a VDD potential

[OFF] = Inactive input, open or connected to 0V

1 - Check the Notes and Acronyms List at the beginning of this document

CDM710

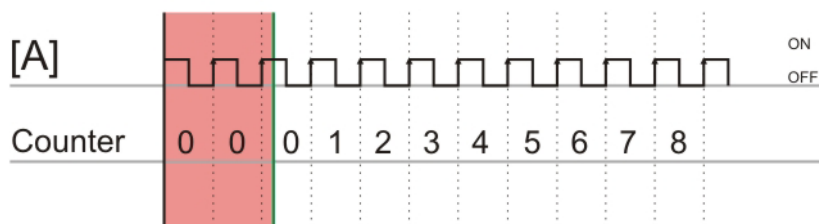
[X1] = Enable / Disable count by status

[X2] = Enable / Disable count in function of transitions from 0V to VDD

VDD = Nominal voltage of input signals (12 to 24Vdc)

Configuration 1 – Standard pulses counter

It counts the amount of pulses applied at the input [A], and the counter reset is controller using Ladder.

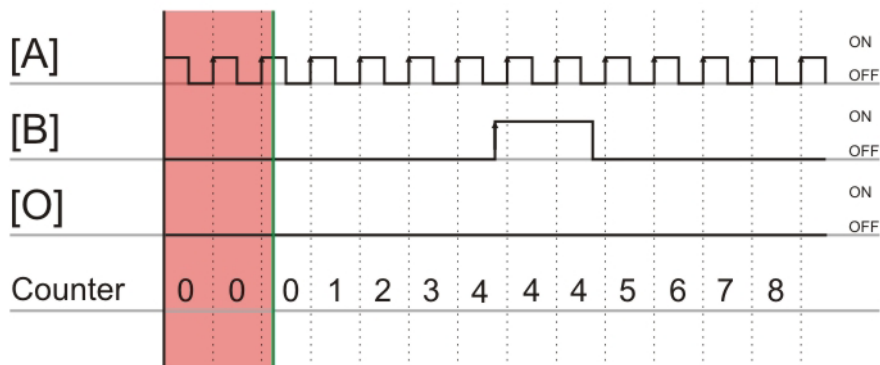


Configuration 2 – Counter with (Enable / Disable) by status

In this configuration, the counter can or not be enabled in function of the signal status applied at [B], where:

Input [B] = ON: It keeps the counter disabled

Input [B] = OFF: It keeps the counter enabled

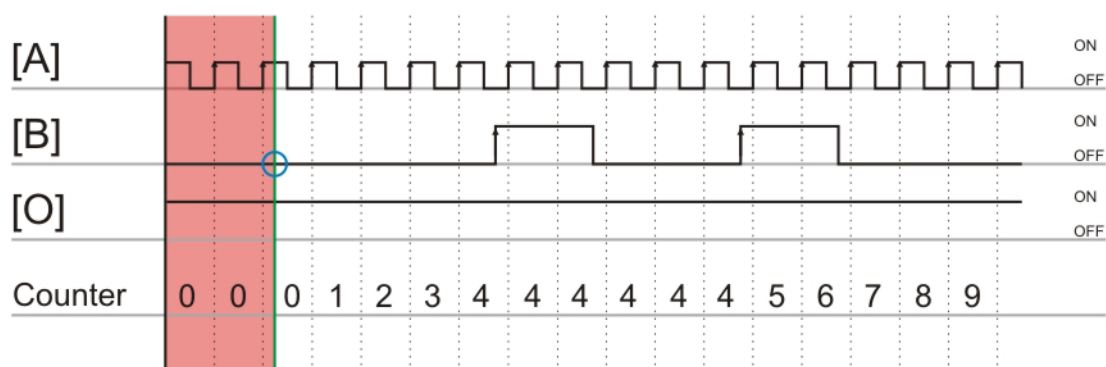


Configuration 3 – Counter with (Enable / Disable) – Trigger mode

In this configuration, the counter can or not be enabled, in function of the transitions of the signal applied in [B]. The way the module interprets the transition can be defined by the status of [B], at the moment that the reset of the counter block placed at the ladder program is released.

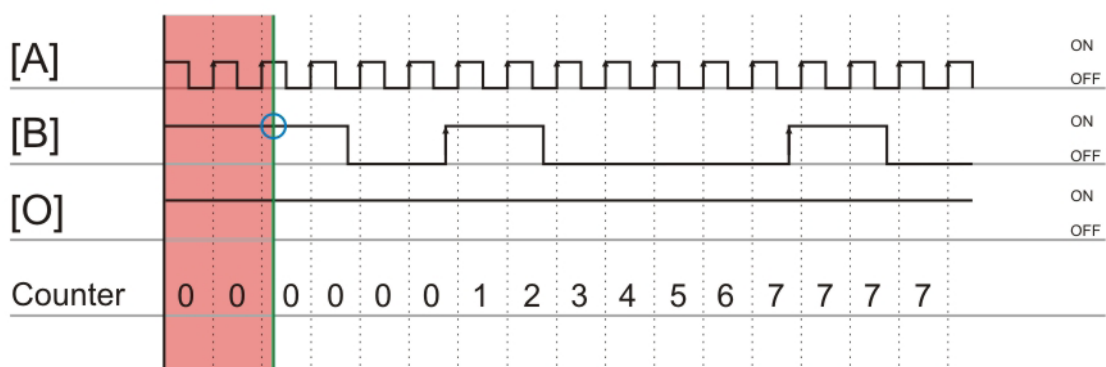
Example 1:

If at the moment that the counter block reset is released the estate [B] = OFF, the counter is enabled keeping in this condition until rising transition occurs of the signal applied in [B] disabling the counter.



Example 2:

If at the moment that the counter block reset is released, the status of [B] is active, the counter keeps initially disabled until there is a rising transition of the signal applied in [B], which will enable the counter.



ENC 0 / ENC 1 functionalities – Digital Input

ENC 0 and ENC 1 channels are mapped as digital inputs from 8 to 15. This way, even using them with the mode (encoder¹ / fast counter), the channels' status can be read as a common digital input using a Ladder program.



IMPORTANT: Note that this functionality does not need the configuration using hardware, so, for reading the status, insert a digital input operator at the Ladder program.

¹ - Check the Notes and Acronyms List at the beginning of this document

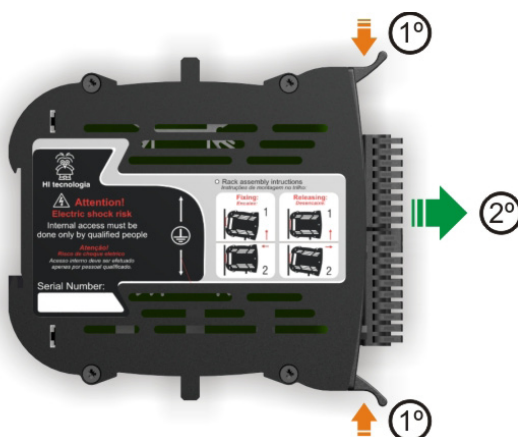
Inputs mapping

Channel	Input	Identifier
ENC 0	[A]	I08 input
	[B]	I09 input
	[O]	I10 input
	[M]	I11 input
ENC 1	[A]	I12 input
	[B]	I13 input
	[O]	I14 input
	[M]	I15 input

Removing the module from the rack

CDM710 modules CAN be replaced with the device turned on (Hot Swap¹).

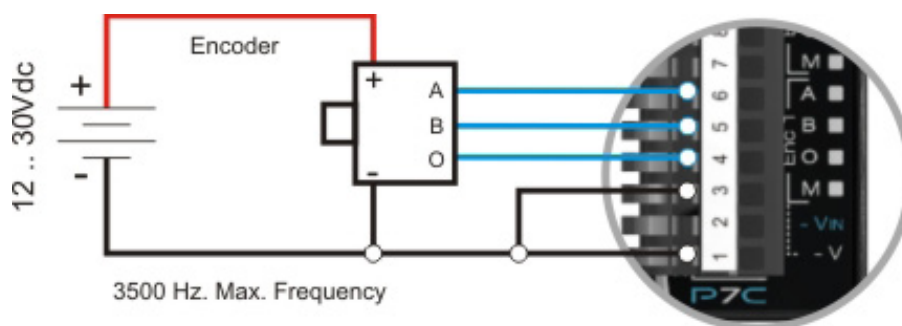
To remove the module from the main rack, push the two locks, one against the other, to unlock the plastic frontal. At this moment, pull them in order to remove them from the rack.



1º - Press the locks, one against the other, using the two hands (it is not necessary to use a lot of force for that, just the enough to unlock. Each lock needs be moved at +/- 3mm (as indicated at the picture).

2º - With the locks pressed, pull them in order to disconnect the module from the rack (as indicated at the picture).

Encoder / Counter utilisation examples

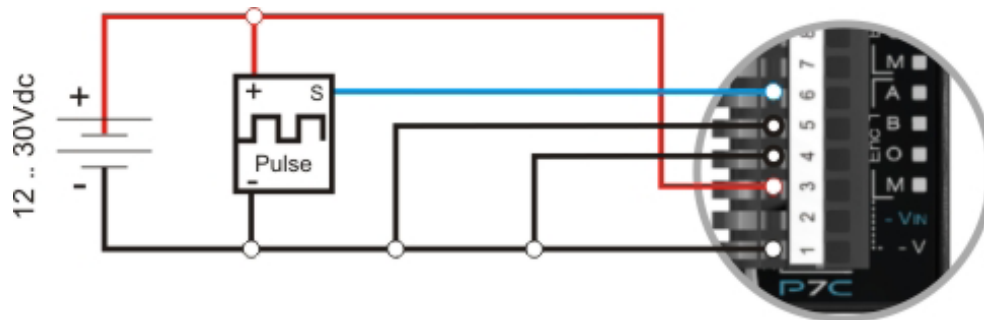


Note: The modules can have lever connectors (for the new modules) or screw connectors.

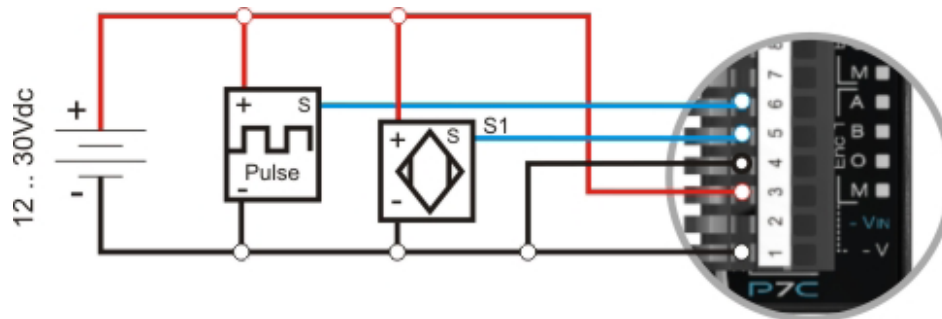
1 - Check the Notes and Acronyms List at the beginning of this document

CDM710

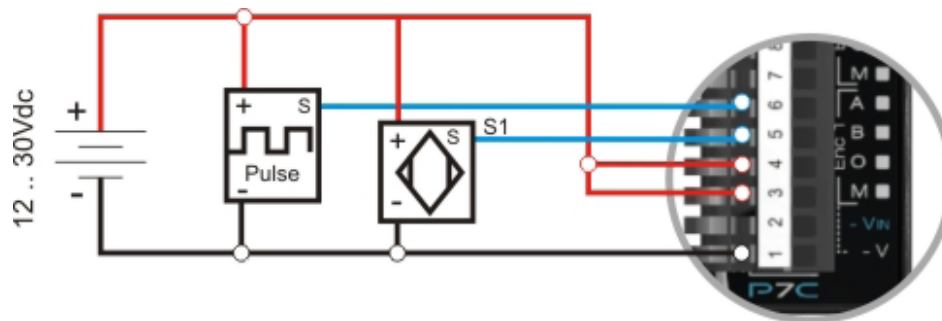
Operation as fast counter – Configuration 1



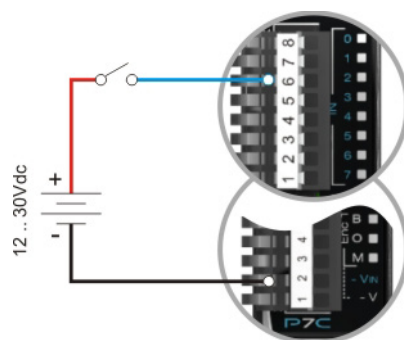
Operation as fast counter – Configuration 2



Operation as fast counter – Configuration 3



Digital Inputs utilisation examples

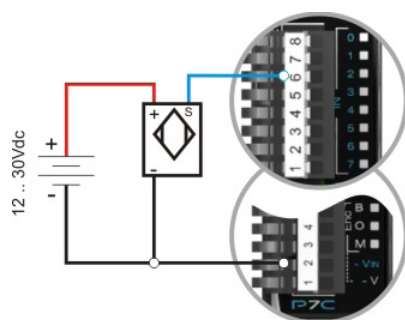


Keys, stop switches, etc

Note: The modules can have lever connectors (for the new modules) or screw connectors.

1 - Check the Notes and Acronyms List at the beginning of this document

CDM710

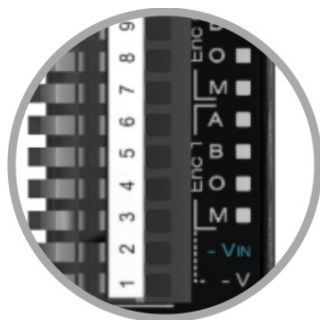


3 wires sensors, optical, magnetic, capacitive, etc

Process interface leds operation



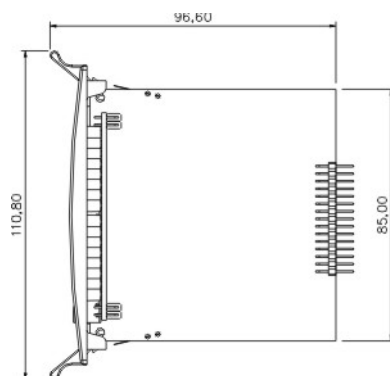
Status	Conf.	Condition	Diagnosis
On	I (0 to 7)	There is signal at the input	There is a valid minimum voltage level, present at the input
Off	I (0 to 7)	There is no signal at the input	Inactive input signal; Equipment turned off; Module not operational.



Status	Conf.	Condition	Diagnosis
On	E N C (0 and 1)	There is signal at the input	There is a valid minimum voltage level, present at the input
Off	ENC (0 and 1)	There is no signal at the input	Inactive input signal; Equipment turned off; Module not operational.

Note: The modules can have lever connectors (for the new modules) or screw connectors.

Dimensions (mm)



Product Part Number

Part Number	Identification
300.107.710.000	2 quadrature counter channels (up to 3500 Hz) and 8 digital inputs

1 - Check the Notes and Acronyms List at the beginning of this document

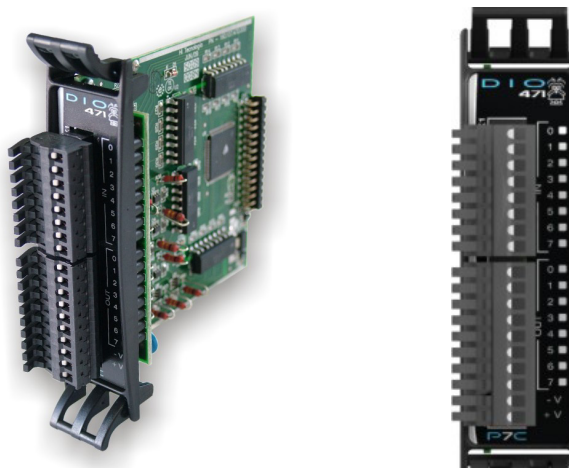
CDM710

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DIO470/471 Technical Specifications

Presentation

DIO470/471 are the P7C¹ interface modules for digital inputs and outputs. They provide 8 digital inputs channels, electrically isolated by opto-coupler¹ for signals from 12 to 30 Vdc PNP¹ type, and 8 digital outputs channels, for PNP¹ transistors, electrically isolated by opto-coupler¹, being able to commute charges with voltages from 12 to 24 Vdc (external supply) / 500 mA¹, short-circuit protection. All the channels have individual leds to indicate the input status (on/off). Modules with automatic addressing, being allowed the simultaneous use of modules at P7C¹. Frontal connector¹ of removable signals and wires connection using screws. Modules are easily inserted/removed from the rack.



Compatible with the module DIO470

Note: The modules can have lever connectors (for the new modules) or screw connectors.

Compatibility

The following table presents the CPU modules compatible with the modules used:

Module	P7C Controller	
	CPU300	CPU301
DIO470*	Yes	Yes
DIO471	No	Yes

(*) – It must not be used with controllers that have 2 expansion racks

¹ - Check the Notes and Acronyms List at the beginning of this document

Technical Specifications

Power Supply	5 Vdc (supplied by main rack)
Consumption	0,5 W
Operation Temperature	0 to 60 °C
Storage Temperature	-25 °C to 80 °C
Humidity	≤90% without condensation
Module weight	0,06 Kg approximately
Dimensions	85 (W) x 83 (H) x 27 (L) mm

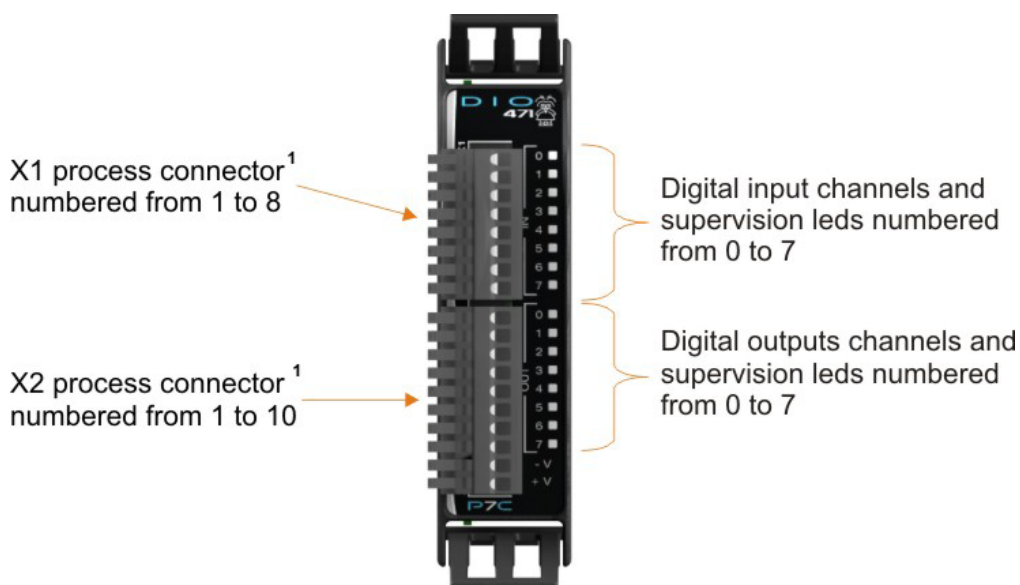
Technical Data - Input

Input type	12 to 30 Vdc / PNP ¹
Maximum frequency	200 Hz (it varies in function of scan time)
Isolation voltage	5 kV rms
Protection	Against polarity inversion

Technical Data - Output

Output type	12 to 24 Vdc / PNP ¹
Maximum frequency	500 Hz (it varies un function of the scan time)
Isolation voltage	5 kV rms
Protection	Short-circuit protected
Maximum current by channel	500 mA ¹
Maximum voltage (switching)	24 Vdc

Process Interface



Compatible with the module DIO470

Note: The modules can have lever connectors (for the new modules) or screw connectors.

¹ - Check the Notes and Acronyms List at the beginning of this document

DIO470/471

Connections

The modules DIO470/471 have two process interface connectors¹, identified as X1 (8 terminal blocks¹ and X2 (10 terminal blocks¹). These terminal blocks¹ are numbered as the following tables will show::

X1 Terminal Connector ¹	Signal
1	0 digital input channel
2	1 digital input channel
3	2 digital input channel
4	3 digital input channel
5	4 digital input channel
6	5 digital input channel
7	6 digital input channel
8	7 digital input channel

X2 Terminal Connector ¹	Sginal
1	0 digital output channel
2	1 digital output channel
3	2 digital output channel
4	3 digital output channel
5	4 digital output channel
6	5 digital output channel
7	6 digital output channel
8	7 digital output channel
9	Channels negative reference (-V)
10	Channels positive reference (+V)

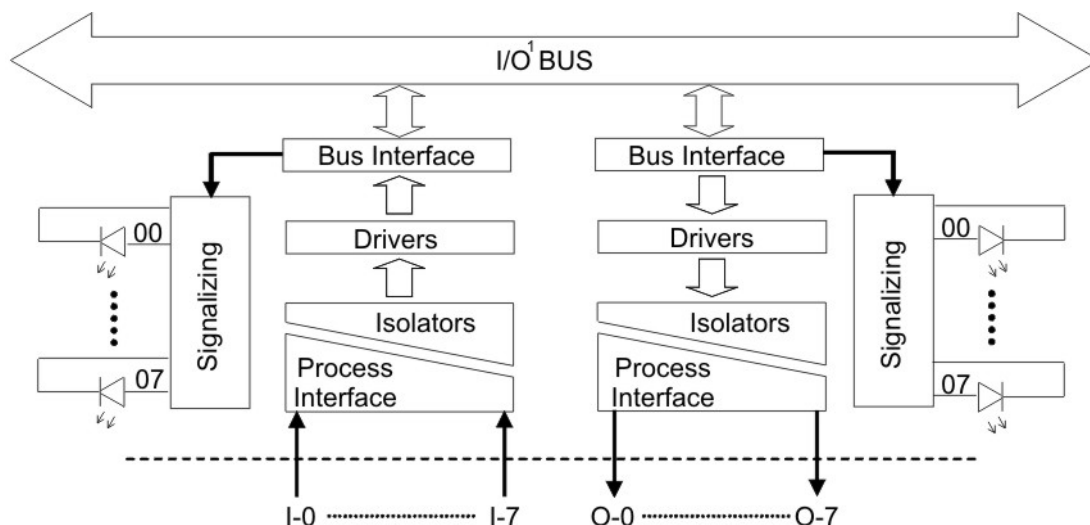


IMPORTANT: The negative references must be turned on at 0 Volt of the DC power supply in order to supply the process sensors. The positive reference must be connected into a voltage from 12 to 24 Vdc of the DC power supply used for supplying the process sensors and transmitters.

If not connected to one of the references (negative, positive or both), the module executes its function.

¹ - Check the Notes and Acronyms List at the beginning of this document

Block Diagram

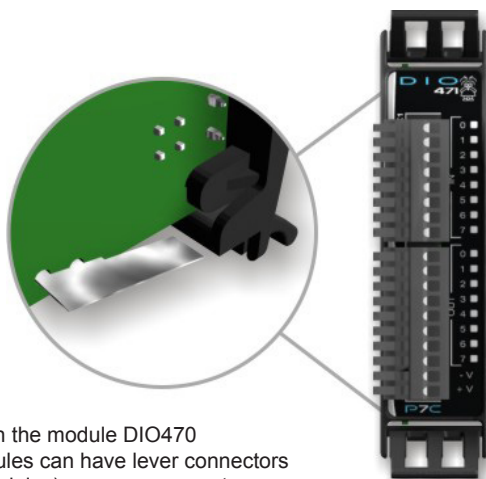


Ground connector

There are two ground connectors at the module side, which are responsible for the contact with the main rack structure.



IMPORTANT: When handling the module, be careful to not hurt yourself with the ground connectors, because they have a sharp surface.



Compatible with the module DIO470
 Note: The modules can have lever connectors (for the new modules) or screw connectors.

Module Addressing

The modules DIO470/471 have not addressing configuration using hardware (strap¹ / switch). It is provided automatically by the controller firmware when connected to the rack.

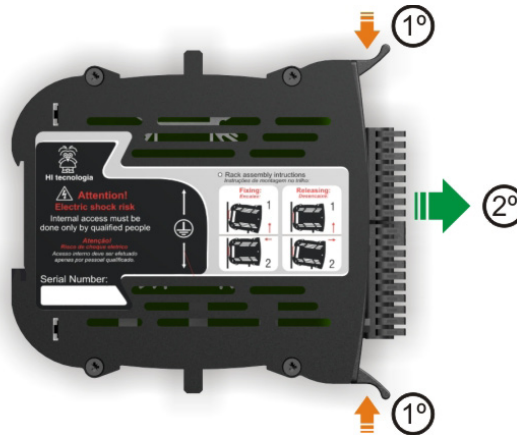
¹ - Check the Notes and Acronyms List at the beginning of this document



Removing the module from the rack

DIO470/471 modules CAN be replaced with the device turned on (Hot Swap¹).

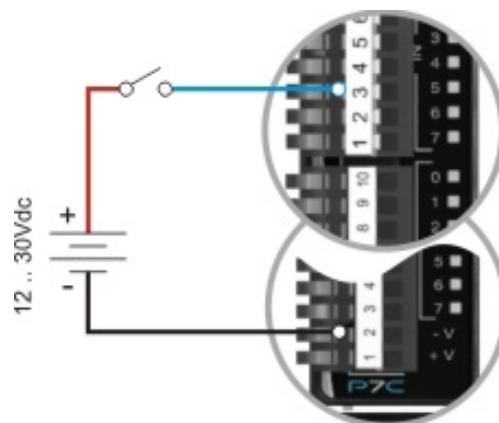
To remove the module from the main rack, push the two locks, one against the other, to unlock the plastic frontal. At this moment, pull them in order to remove them from the rack..



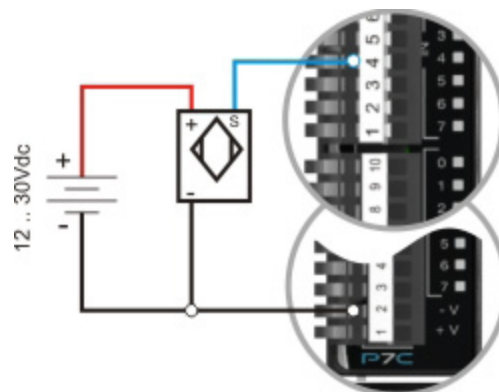
1º - Press the locks, one against the other, using the two hands (it is not necessary to use a lot of force for that, just the enough to unlock. Each lock needs to be moved at +/- 3mm (as indicated at the picture).

2º - With the locks pressed, pull them in order to disconnect the module from the rack (as indicated at the picture).

Digital inputs utilisation examples



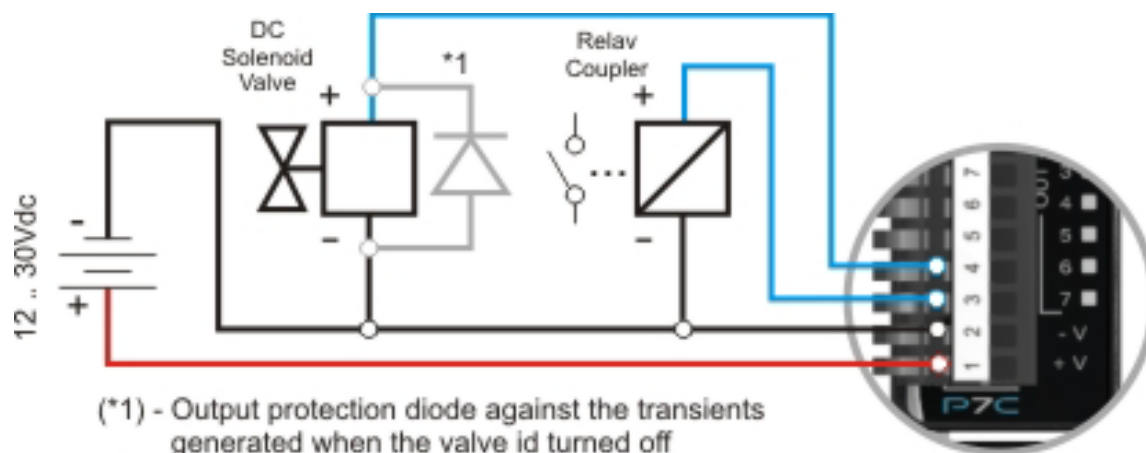
Keys, stop switches, etc



3 wires sensors, optical, magnetic, capacitive, etc.

1 - Check the Notes and Acronyms List at the beginning of this document

Digital outputs utilisation example



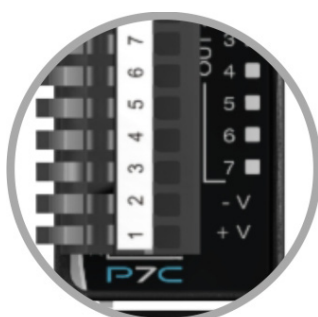
Compatible with the module DIO470

Note: The modules can have lever connectors (for the new modules) or screw connectors.

Process interface leds operation



Status	Conf.	Condition	Diagnosis
On	I(0 to 7)	There is voltage signal at the input	There is a valid minimal voltage level, present at the digital input.
Off	I(0 to 7)	There is no voltage signal at the input	Inactive input signal; Device turned off; Module not operational.

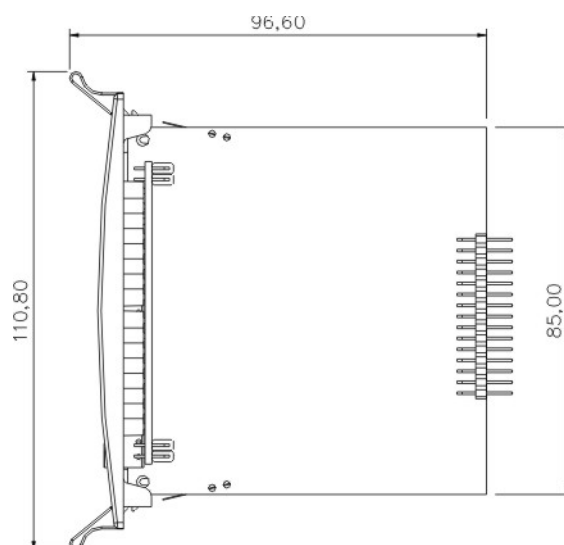


Status	Conf.	Condition	Diagnosis
On	O(0 to 7)	There is voltage signal at the output (output on)	Output activating the load connected to it. Note: the led signaling can keep active even if the output transistor be damaged.
Off	O(0 to 7)	There is no voltage signal at the output (output off)	Inactive output signal; Device turned off; Module not operational.

Compatible with the module DIO470

Note: The modules can have lever connectors (for the new modules) or screw connectors.

Dimensions (mm)



Product Part Number

Part Number	Identification
300.107.470.000	8 digital inputs and 8 digital outputs module (compatible with CPU300/301)
300.107.471.000	8 digital inputs and 8 digital outputs module (compatible with CPU301)

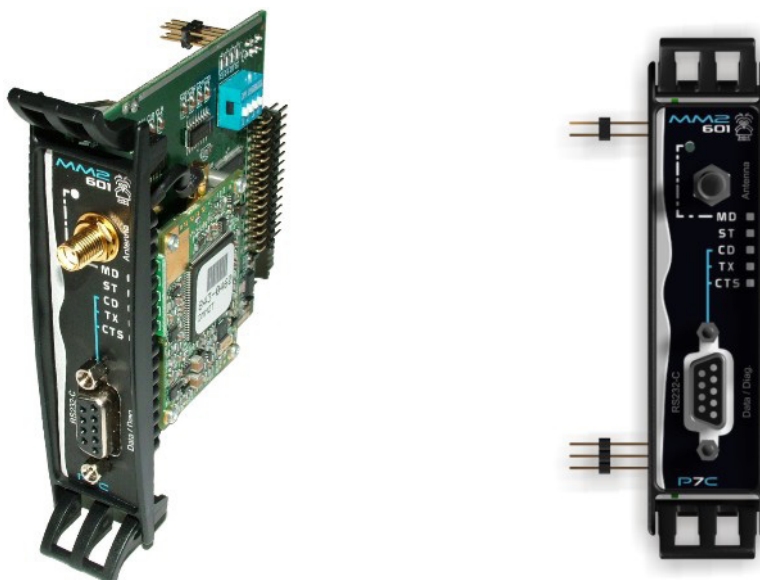
13

MM2601 Technical Specifications

Presentation

MM2601 is the P7C¹ radio module with frequency hopping technology, operating on a range from 902 to 928MHz, with programmable power on the range from 5mW to 1000mW. This module has automatic addressing, status and operation leds and two frontal connectors¹, one for connection with the radio external antenna and another for serial communication, providing two serial RS232-C¹ channels (A and B).

Functionally, this module allows the direct communication of the CPU module with the radio, through a COM3 serial channel (factory defaults) and it also has the option of communicating the CPU and the radio module, through the frontal serial connector¹ when operating on the mode "Radio with data channel on Serial A". Another feature available at this module is the direct access to CPU's COM3 serial channel.



Technical Specification

Power Supply	5 Vdc (supplied by main rack)
Consumption	1,2 W
Operation Temperature	0 to 60 °C
Storage Temperature	-25 °C to 80 °C
Humidity	≤90% without condensation
Module weight	0,06 Kg approximately
Dimensions	85 (W) x 83 (H) x 27 (P) mm

Technical Data – Radio Module

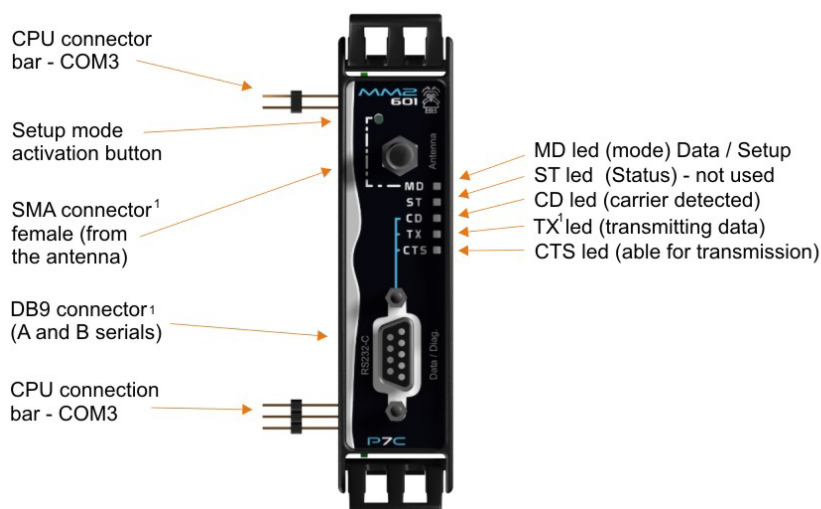
Modulation	Spread Spectrum GFSK 120 or 170 Kbps
Frequency	902 – 928 MHz with configurable enabling/blocking of sub-ranges

¹ - Check the Notes and Acronyms List at the beginning of this document

Power	5mW to 1 W
Maximum reach	60 miles (96 Km) with clear view
Operation mode	Point to Point, Point to Multipoint and TDMA
Serial channels	Data channel Diagnosis channel
Baud rate	115 Kbauds (38400 without flow control)
Transmission current, maximum power with 100% duty cycle	635 mA ¹
Reception current	135 mA ¹
Maintenance current	19 mA ¹

The radio module has an internal data buffer of 512 bytes. When the application protocol limits the number of received/sent data, in each communication transaction smaller than this value (512 bytes), the radio can operate with a baudrate between 1200 and 115000 without needing a flow control using hardware. If not so, the maximum baud rate must be limited in 38400. SCP-HI¹ and Modbus-RTU¹ protocols allow programming the communication rate (baud rate) at all the range allowed by the radio.

Process Interface



Connections

The module MM2601 has a DB9 female connector¹ where are available the serial channels A and B, as the following table shows. The signals are mapped in function of the operation mode determined through a Dip Switch¹. For more information, check the topic “Operation Mode”.

DB9	Direction	Note
1	Output	-
2	Output	<i>TX - Serial A</i>
3	Input	<i>RX - Serial A</i>
4	Input	-
5	-	<i>0 Volt</i>
6	Output	<i>TX - Serial B</i>
7	Input	<i>RX - Serial B</i>
8	Output	-
9	Input	-

¹ - Check the Notes and Acronyms List at the beginning of this document

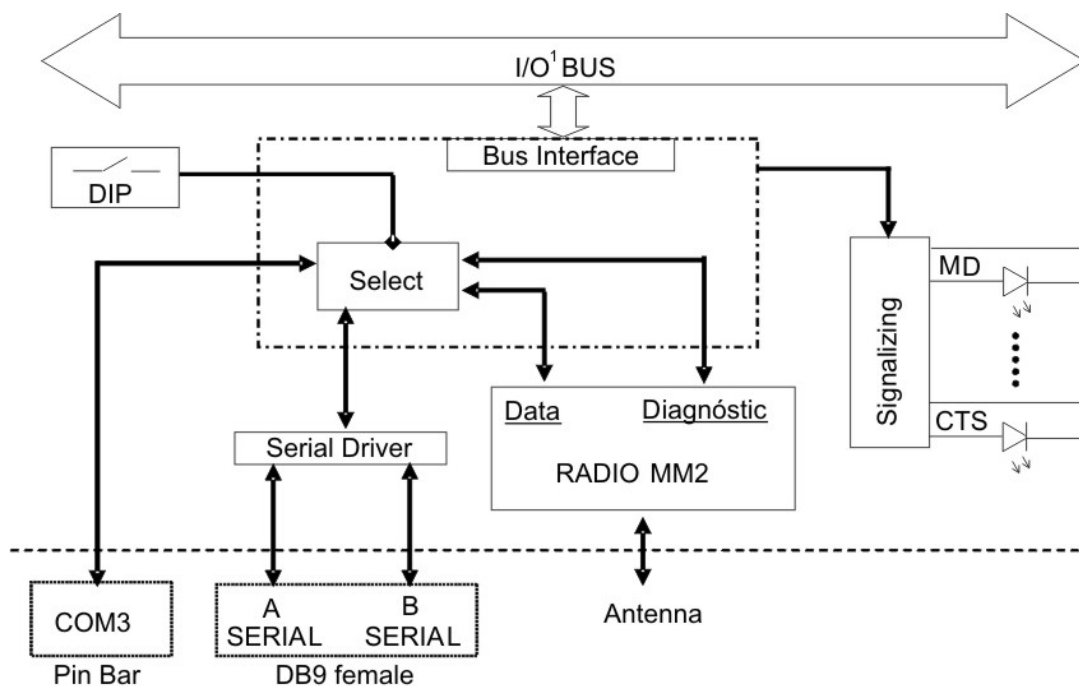
Protocols

The radio operates with any serial protocol available.



IMPORTANT: The radio MM2601 has a maximum transmission power of 1000 mW. It is recommended that the transmission antenna be kept away from people, at least, 23cm, in order to attend the FCC RF limits.

Block Diagram

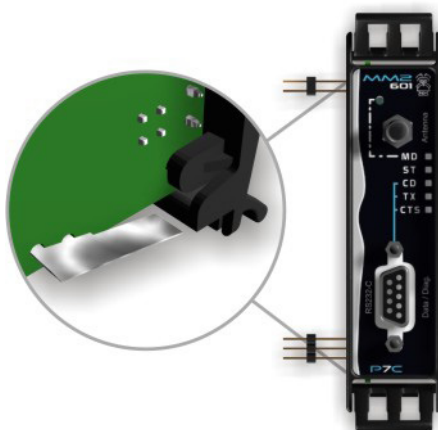


Ground connector

There are two ground connectors at the module side, which are responsible for the contact with the main rack structure.



IMPORTANT: When handling the module, be careful to not hurt yourself with the ground connectors, because they have a sharp surface.



1 - Check the Notes and Acronyms List at the beginning of this document



Module Addressing

The module MM2601 has not addressing configuration using hardware (strap¹ / switch). It is provided automatically by the controller firmware when connected to the rack.

Operation Modes

MM2601 can operate in function of the configuration of the Dip Switch¹ – SW1.

DIP	1	2	3	4	Flow Control	Serial [A]	Serial [B]	Serial [COM3]	Operation Mode
SW1	OFF	OFF	OFF	OFF	No	Radio DIAG.	-	Radio DATA	Radio with data channel at COM3
	ON	OFF	OFF	OFF	Yes				
	OFF	ON	OFF	OFF	No	Radio DATA	Radio DIAG.	-	Radio with data channel at SERIAL [A]
	ON	ON	OFF	OFF	Yes				
	OFF	X	ON	OFF	No	AUX	-	AUX	Serial auxiliar (No radio)
	ON	X	ON	OFF	No				
	-	-	-	-	-	-	-	-	Loop test*

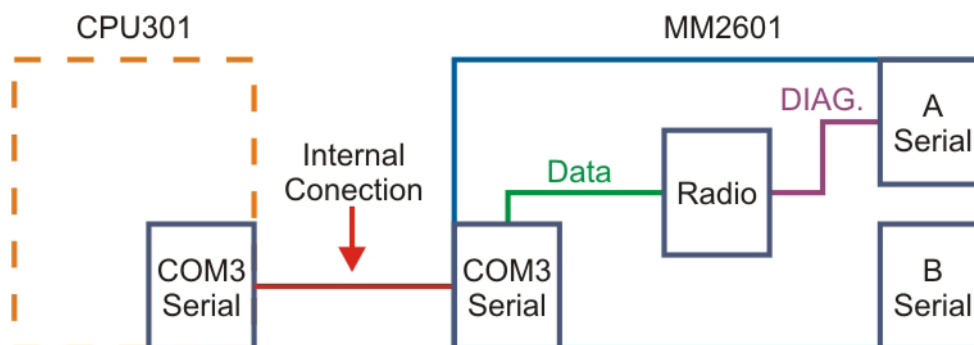


“X” - The key status does not influence in the composition of the configuration

(*) For any configuration different from the three first modes, the module will be kept under the condition Loop test.

Radio with data channel at COM3 serial

In this mode, the radio data channel will be connected to the serial channel (COM3) of CPU module and the diagnosis radio channel will be mapped at the DB9 connector¹ placed in the front of the module.



The order of DB9 connector¹ signals, for this operation mode, is presented below:

DB9	Signal	Direction	Description
1	CD	Output	Carrier Detect
2	DTD	Output	Diag Transmit Data
3	DRD	Input	Diag Receive Data
4	DTR	Input	Data Terminal Ready
5	GND ¹	-	0 Volt
6	NC	Output	-
7	NC	Input	-

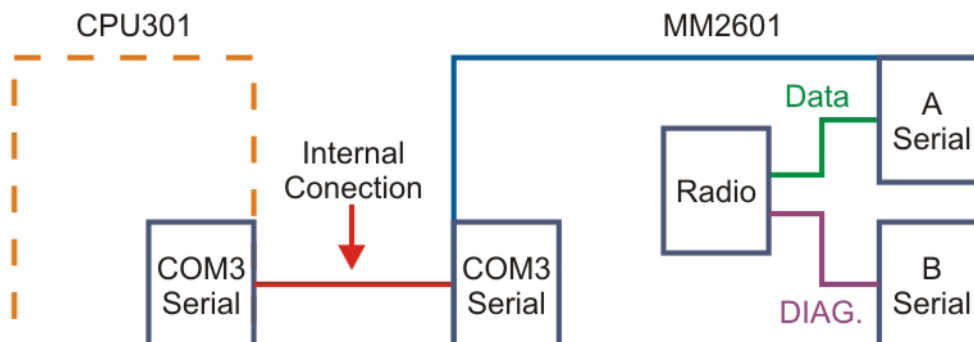
1 - Check the Notes and Acronyms List at the beginning of this document

8	NC	Output	-
9	NC	Input	-

“NC” - Not connected

Radio with data channel at SERIAL A

In this mode, the radio data channel will be mapped at (Serial A) the DB9 connector¹ placed in the frontal of the module, operating identical to the module MM2600, where for the connection of the radio and the CPU module is necessary to use an external cable (PIC 302.107.600.000).



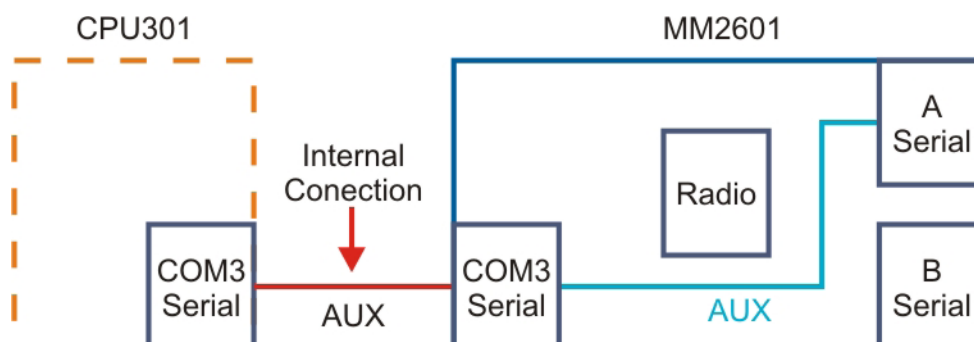
The order of DB9 connector¹ signals, for this operation mode, is presented below:

DB9	Signal	Direction	Description
1	CD	Output	Carrier Detect
2	TX ¹	Output	Transmit Data
3	RX ¹	Input	Receive Data
4	DTR	Input	Data Terminal Ready
5	GND ¹	-	0 Volt
6	DTD	Output	Diag Transmit Data
7	RTS *	Input	Request To Send
8	CTS *	Output	Clear To Send
9	DRD	Input	Diag Receive Data

(*) – Available only if activated the flow control through the key SW1 - 1

Auxiliar Serial

In this mode, the radio signals are disconnected from the serial channels and the module MM2601 operates as a simple serial interface for CPU's COM3 channel.



¹ - Check the Notes and Acronyms List at the beginning of this document

The order of DB9 connector¹ signals, for this operation mode, is presented below:

DB9	Signal	Direction	Description
1	NC	Output	-
2	TX ¹	Output	Transmit Data
3	RX ¹	Input	Receive Data
4	NC	Input	-
5	GND ¹	-	0 Volt
6	NC	Output	-
7	CTS *	Input	Clear To Send
8	RTS *	Output	Request To Send
9	NC	Input	-

“NC” - Not connected

(*) – Available only if activated the flow control through the key SW1 - 1



IMPORTANT: Only use cables associated to the modules MM2600/601, even when the module is configured as auxiliar serial, because the signals order follows the standard determined for “Freewave” radios, which is different from the standard used at HI Tecnologia’s PLCs¹.

Mode – Loop Test

This mode keeps MM2601 in a loop state for testing the serial drivers. For effecting the test, the user must jumper the pins (1-CD => 4-DTR), (2-TX=> 3-RX), (7-RTS => 8-CTS), (6-DTD => 9-DRD) of DB9 connector ¹ placed in the front of the module. If the serial driver are operational, interface leds (MD, ST, CD, TX, CTS) must blink simultaneously, with an approximated frequency of 1 Hz.

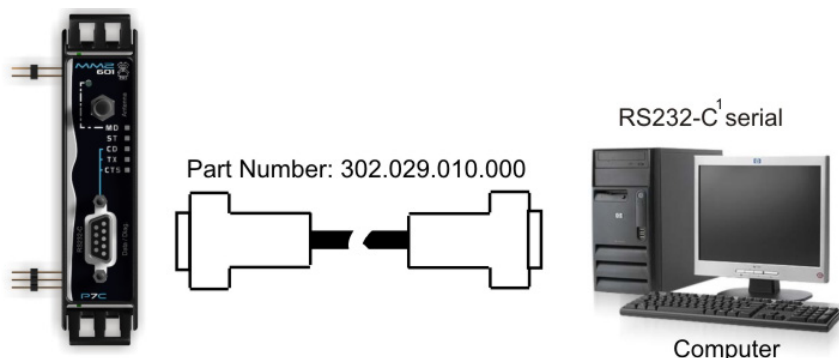
Radio Operation Setup

Software

MM2601 has a setup mode that allows the access to all the radio programming parameters. To access the setup mode, open a data terminal (ex: Windows hyperterminal), configure the terminal for a baudrate operation of 19200, 8 bits¹, without parity and 1 stop bit, and after activate the terminal software connection.

Connection through DIAGNOSIS channel

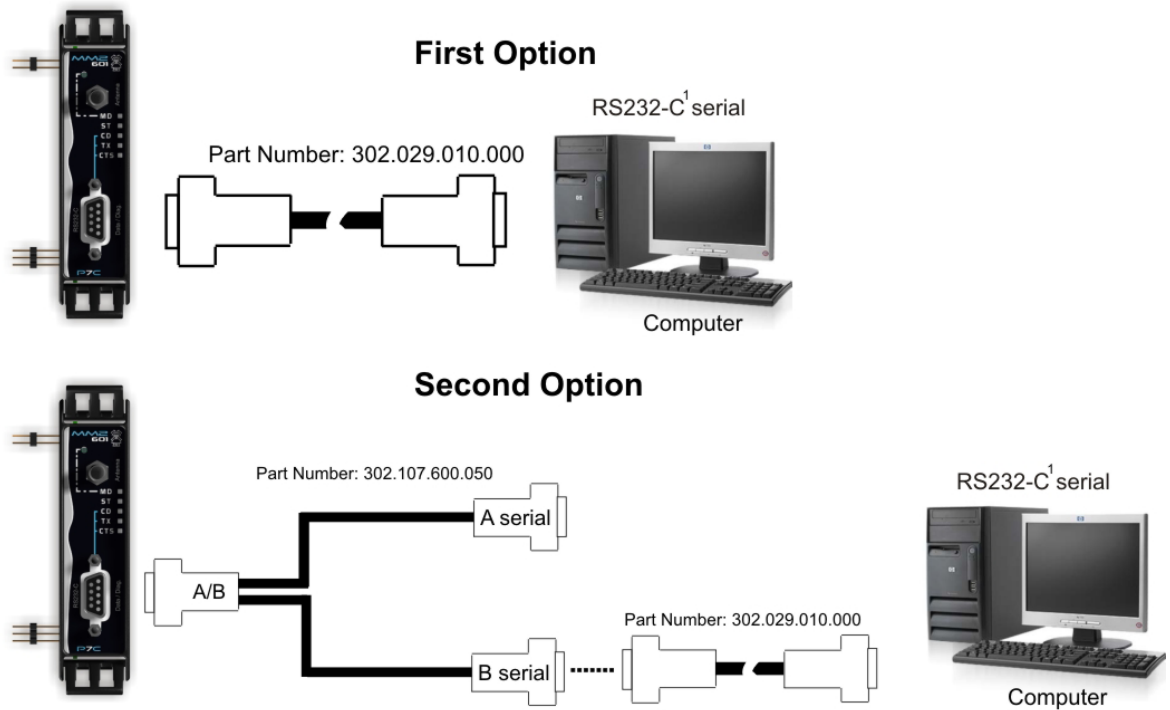
The access through a diagnosis channel is executed when the module is operating on the “default mode” [Radio with data channel at COM3 serial]. The connection of the module with the computer must be executed as the following picture indicates. At this moment, if the radio diagnosis channel is enabled at the terminal software screen, a sequence of characters not organized will be shown. If the channel is disabled, any character will be shown. If the channel is disabled, any character will be presented.



¹ - Check the Notes and Acronyms List at the beginning of this document

Connection through DATA channel

The access through data channel is executed when the module is on the operation mode [Radio with data channel at the Serial A]. In this configuration, the connection of the module with the computer can be executed in two ways: direct or through the cable Y, as indicated in the picture below:

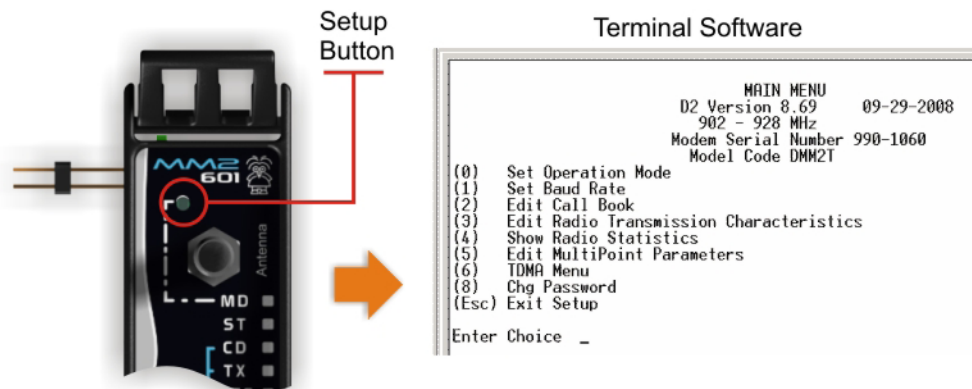


The cable Radio FreeWave – PC (302.029.010.000) does not provide the flow control signals RTS and CTS. The signals are connected each other through jumpers at the cables end.

Accessing the radio setup menu

Manual activation

With the terminal open (as the item Software describes) and the communication cable connected, push the setup button, placed at the top of the frontal panel. The led (MD) will be shown, indicating that the radio is on the setup mode. On the terminal software screen it will be presented a menu of configuration options of the radio parameters.





Activation by remote command

When connected to a diagnosis channel, another way to open the setup menu is typing SHIFT + U at the computer's keyboard. Note that in this option the Led (MD) is not activated.

Note: The activation using a remote command does not work through a data channel.

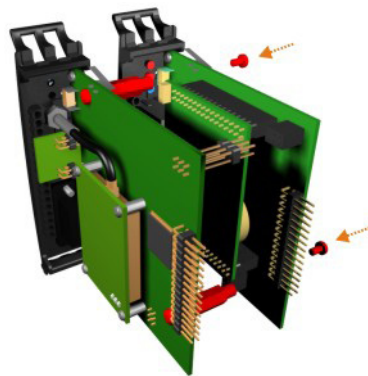
Navigation - (Menu)

The menu navigation is provided by the numbers or letters in brackets associatead to actions. The return to the screens is made using the key ESC, and to leave the Setup Mode, push ESC a few times and the led (MD) will be é turned off, indicating that the radio is on the operation mode again.

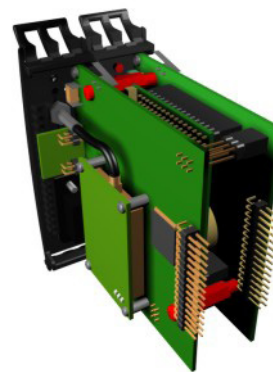
For more information about the radio programming, check the Software Note named "PNS0002700", available at HI Tecnologia's website.

Connecting the MM2601 at the CPU

The connection of the module MM2601 at the CPU must be made as shown at the pictures below: fit the two pin bars of the module MM2601 at the CPU connector¹ and then connect the two modules mechanically, using two screws M3x4.



Picture A: Fitting

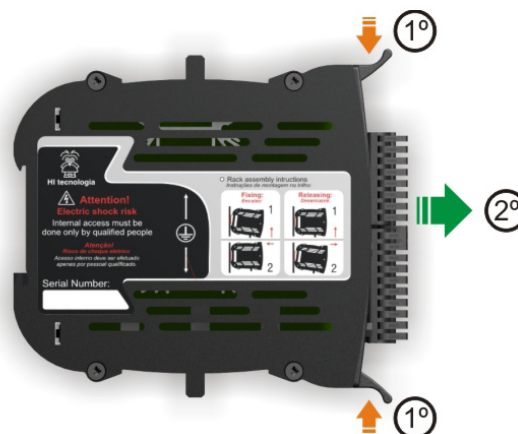


Picture B: Final assembly

Removing the module from the rack

MM2601 modules CAN be replaced with the device turned on (Hot Swap¹).

To remove the module from the main rack, push the two locks, one against the other, to unlock the plastic frontal. At this moment, pull them in order to remove them from the rack.



¹ - Check the Notes and Acronyms List at the beggining of this document



1º - Press the locks, one against the other, using the two hands (it is not necessary to use a lot of force for that, just the enough to unlock. Each lock needs be moved at +/- 3mm (as indicated at the picture).

2º - With the locks pressed, pull them in order to disconnect the module from the rack (as indicated at the picture).

ANATEL certification

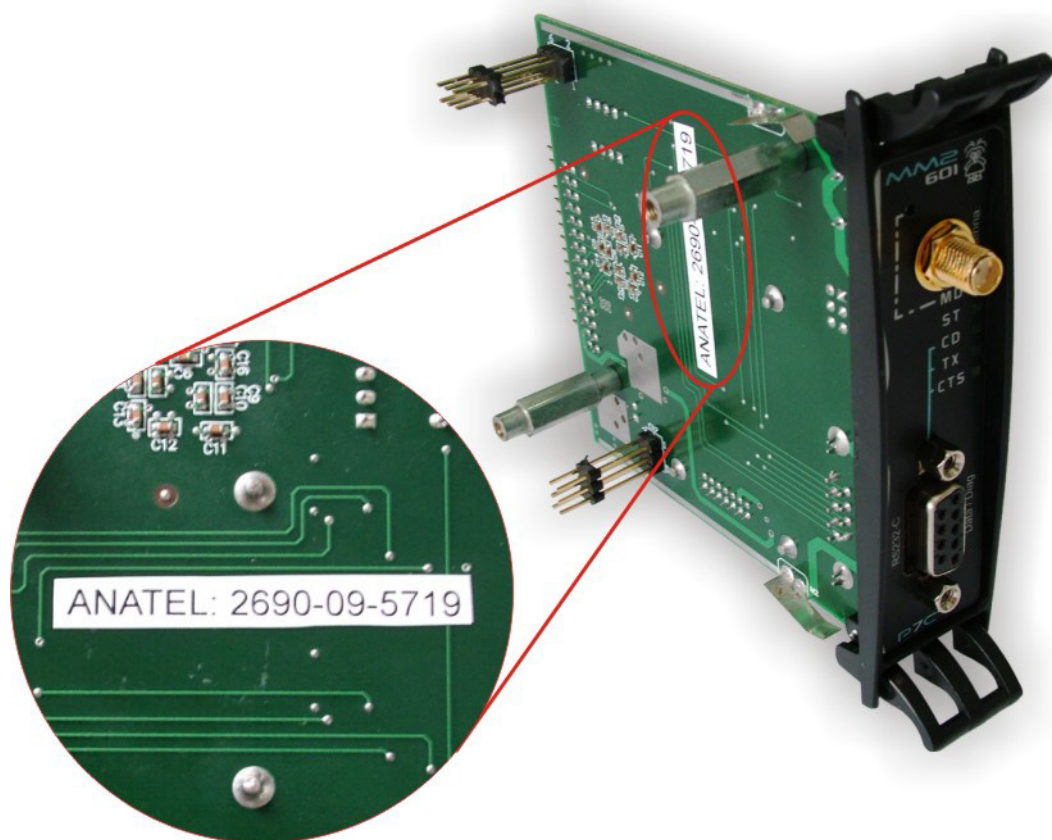
ANATEL stamp and 506 resolution



"Este equipamento opera em caráter secundário, isto é, não tem direito à proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário."

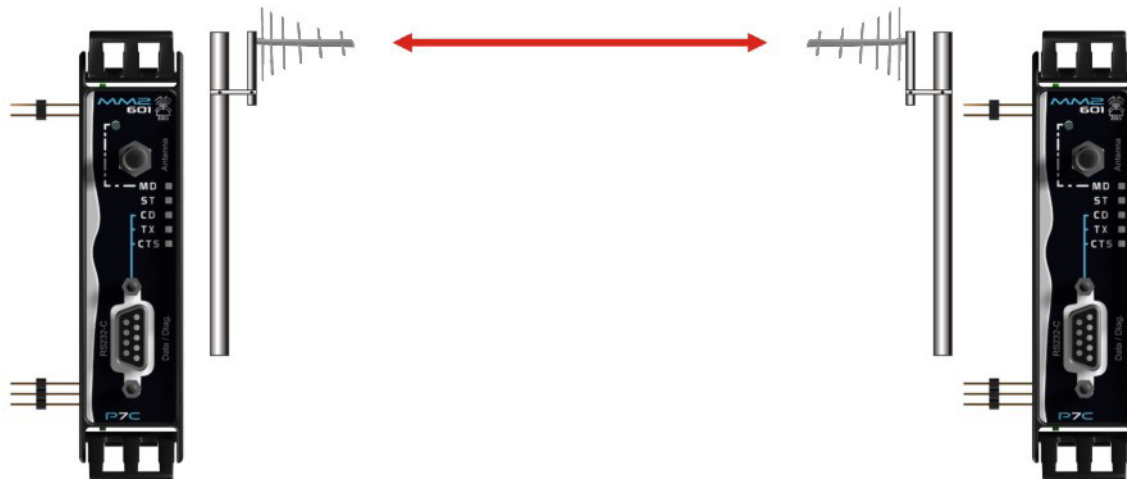
Where is placed the registration number of Anatel?

This number is placed at on the module, as indicated at the following picture:

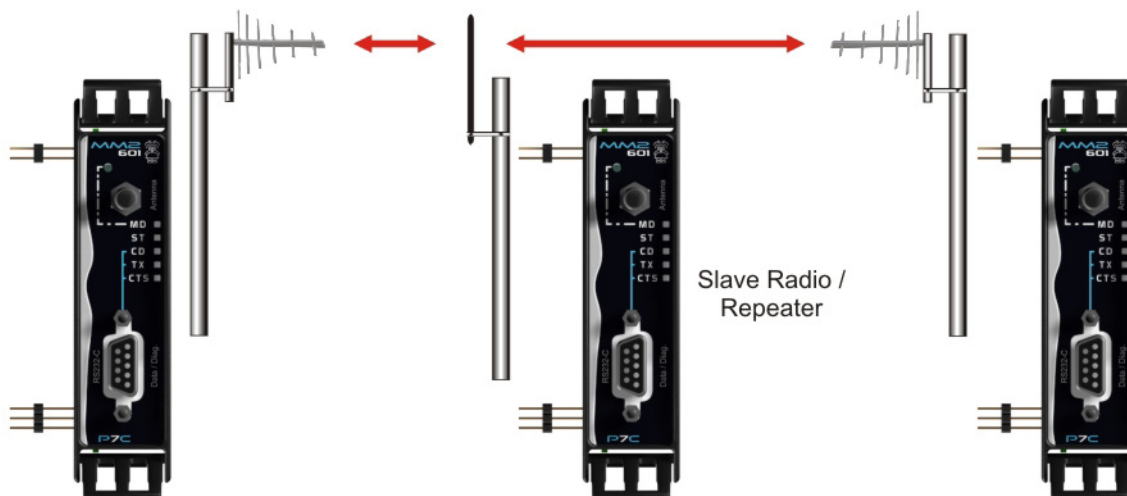


Utilisation examples

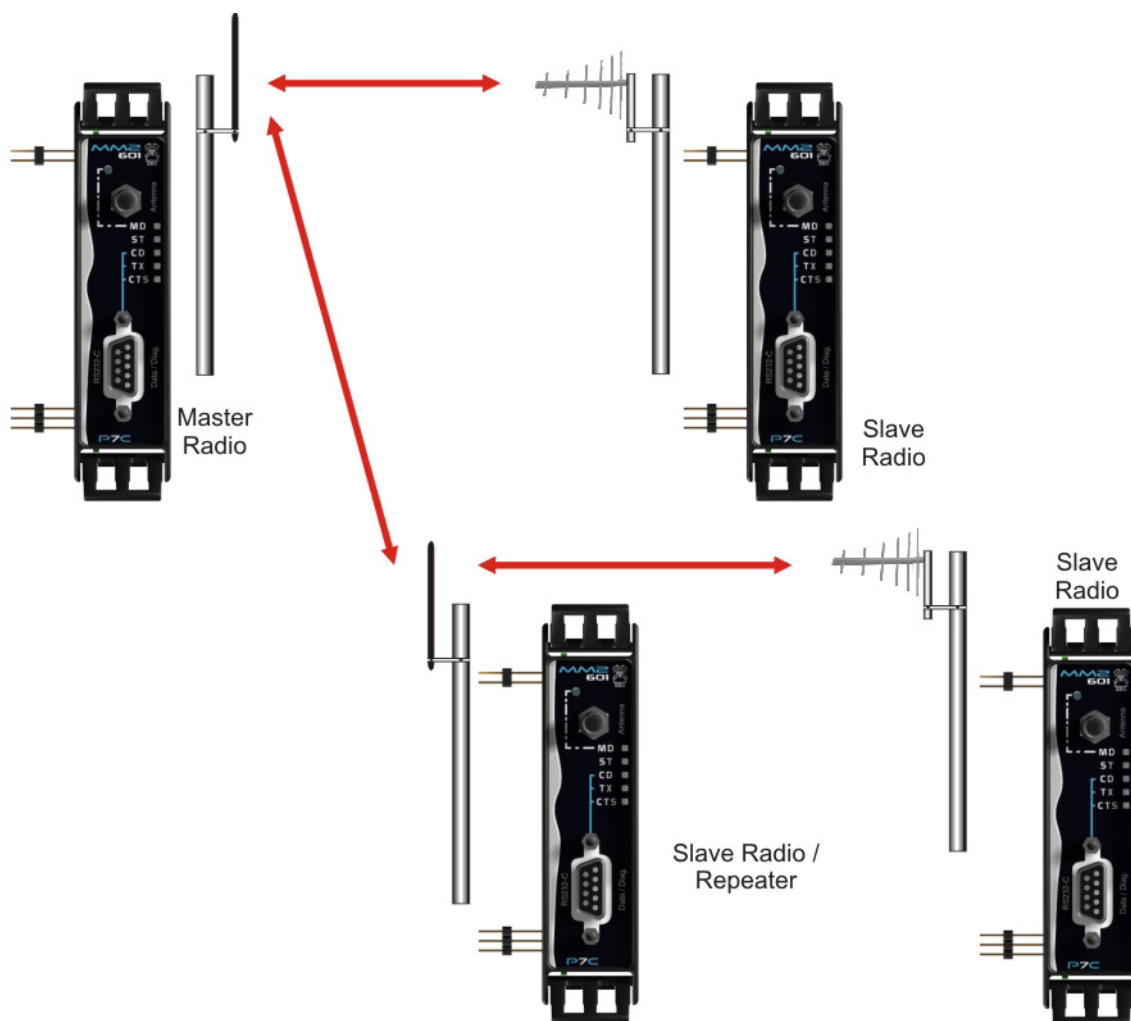
The following example shows the most common connection: master x slave on a point to point connection:



This example shows an standard point to multipoint network:



The next example shows the configuration using a repeater. It must be placed at the highest point of the obstacle between two communication radios (a place that emphasizes the master connection with the slave).



Process interface leds operation

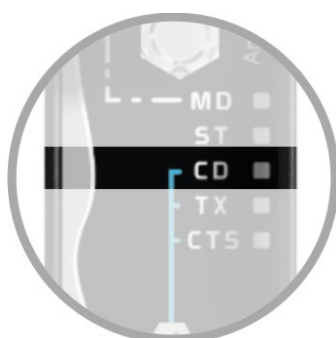
MD led (Mode)



Led	Condition	Note
On	Active radio setup mode	In this condition, using a serial terminal application, it is possible to view and change the radio operation parameters
Off	Active radio data transference mode	In this condition, the radio is able to Exchange application data

ST led (Status)

Led	Condition	Note
On	Serial communication using COM3 port is active	In this condition, the COM1 port keeps inactive
Off	Serial communication using COM1 port is active	In this condition, the COM3 port keeps inactive

CD led (Carrier Detect)

Led	Condition	Note
On	Indicates that radio has active link	In this condition, the radio is able to receive data
Off	Indicates that radio has no active link (porter not detected)	

TX¹ led (Transmit)

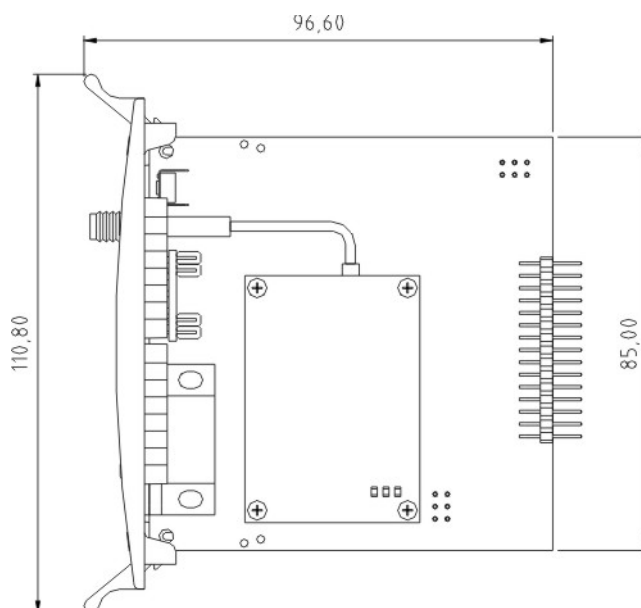
Led	Condition	Note
On	Indicates that the radio is transmitting data	
Off	Indicates that the radio is not transmitting data	

CTS led (Clear To Send)

Led	Condition	Note
On	Indicates that the radio is able to receive new data that will be transmitted	
Off	Indicates that the radio is not able to receive new data that will be transmitted	

1 - Check the Notes and Acronyms List at the beginning of this document

Dimensions (mm)



Product Part Number

Part Number	Identification
300.107.601.000	900MHz / 1W radio module with COM3 support

14

CPU301 Technical Specifications

Presentation

CPU301 is a processing module of P7C¹. This CPU has direct access to all the I/O¹ do modules of the equipment, being responsible for getting and updating all the process signals connected to the PLC¹. It provides memory for the application program, data memory, Data Flash¹, real time clock (RTC¹) and non volatile memory (NV-RAM¹) for information storage. It also has an Ethernet¹ channel, operating on 10/100Mbps, two serial communication channels at one frontal connector¹ DB9 and one internal serial channel for communication with the module placed quite on the right side of the main rack.

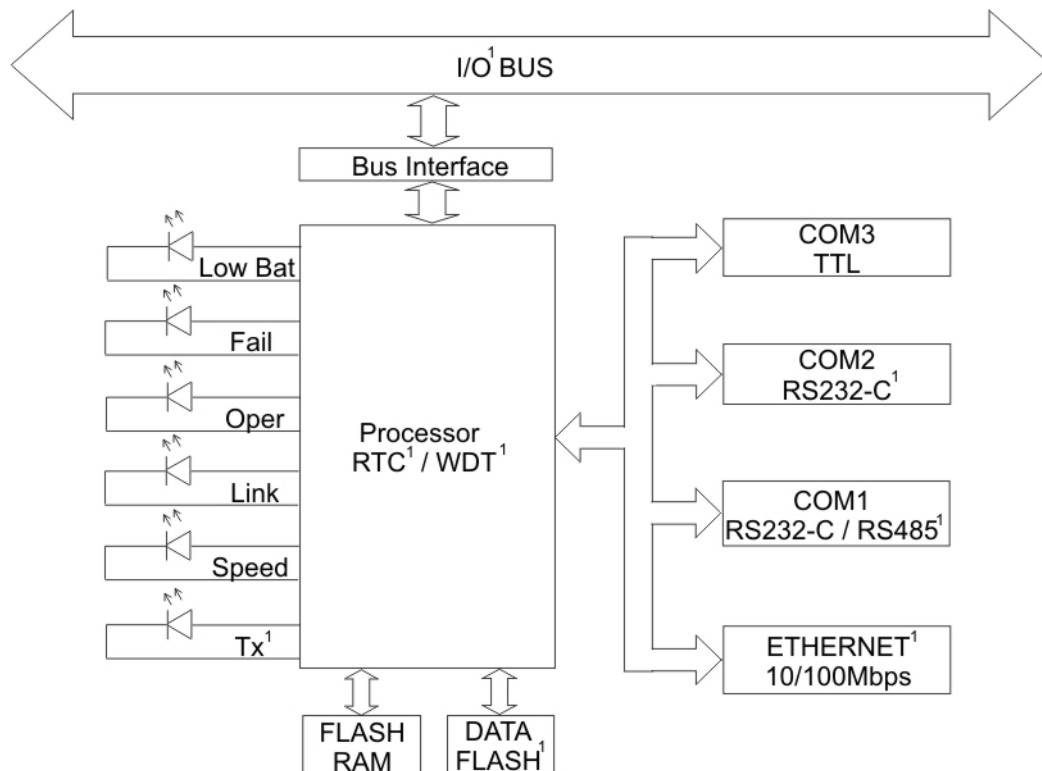


Technical Information

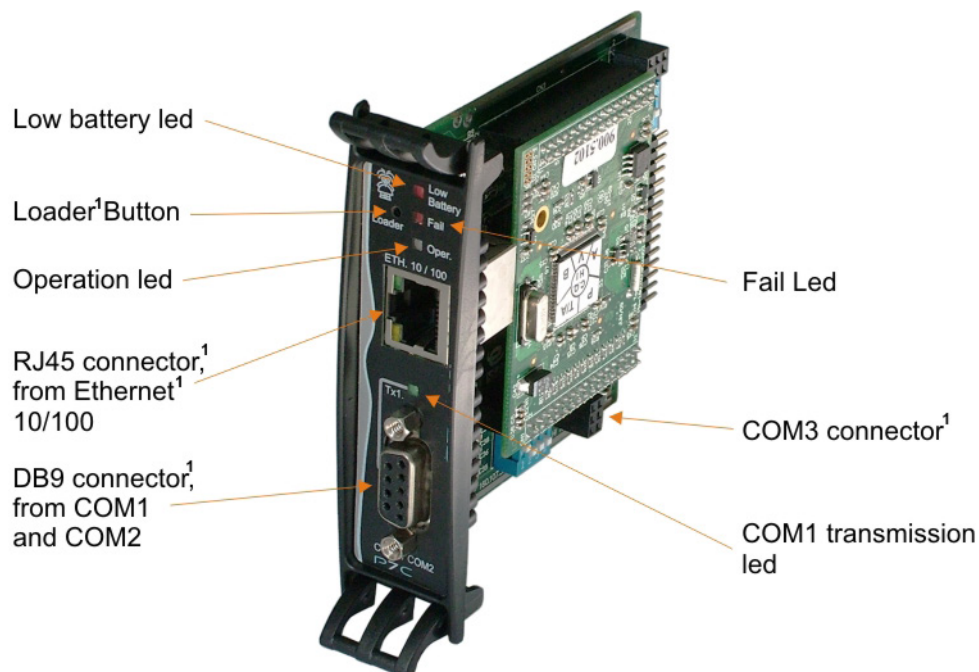
Power Supply	5 Vdc (supplied by main rack)
Consumption	0,8 W
Operation Temperature	0 to 60 °C
Storage Temperature	-25 °C to 80 °C
Humidity	≤90% without condensation
Module weight	0,06 Kg approximately
Dimensions	85 (W) x 83 (H) x 27 (L) mm
Clock	14.5476 MHz x 2
Flash Memory	512 Kbytes
WDT ¹	Yes
RTC ¹	Yes
Battery	Yes (RTC ¹ + NVRAM ¹)
Data Channel	16 Mbits ¹
COM1 Serial Channel	RS232-C ¹ / RS485 ¹ (configurable at the module)
COM2 Serial Channel	RS232-C ¹ Baudrate
COM3 Serial Channel	TTL (connector ¹ internal to the module)
Ethernet ¹ Channel	10 / 100 Mb (automatic)
Time/Logic instructions	0,43µs

¹ - Check the Notes and Acronyms List at the beginning of this document

Block Diagram



Process Interface



¹ - Check the Notes and Acronyms List at the beginning of this document

Ground connector

There are two ground connectors at the side of the module, which are responsible for the contact with the main rack structure.



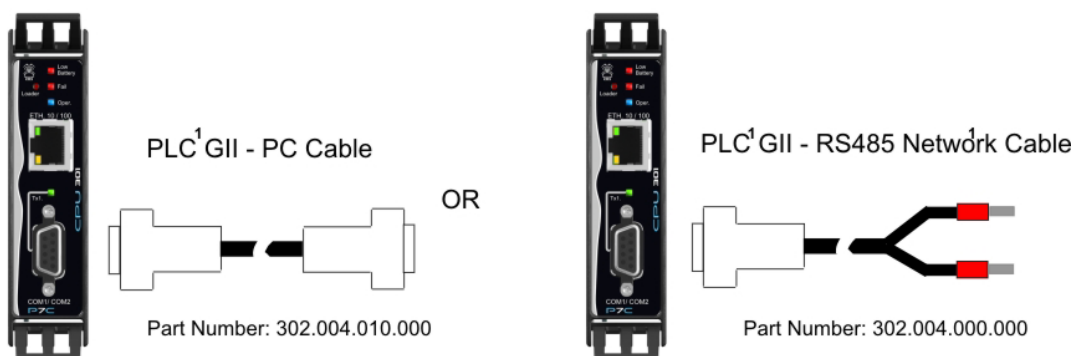
IMPORTANT: When handling the module, be careful to not hurt yourself with the ground connectors, because they have a sharp surface.



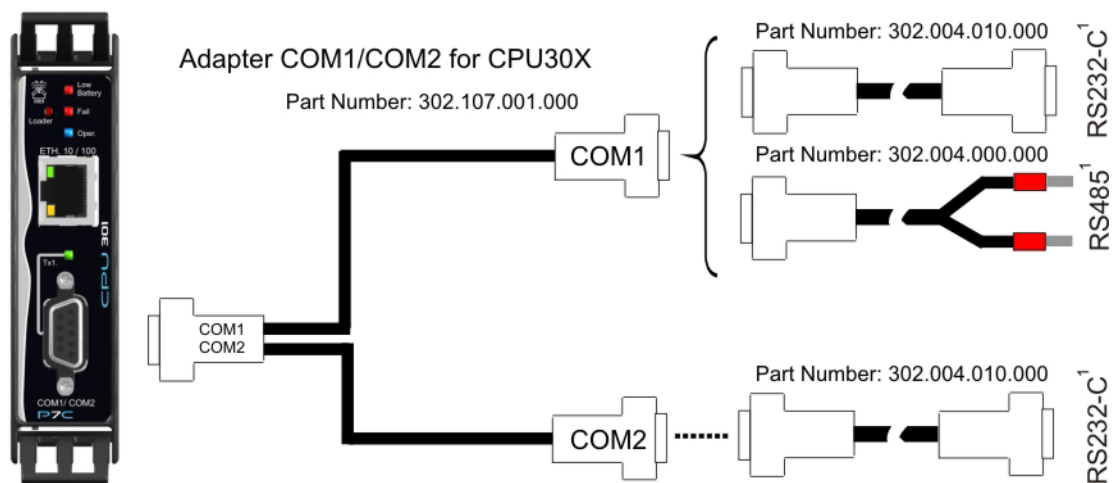
Serial Communication

Serial (COM1 and COM2)

Example of use that can be done with CPU301



For using the two serial (COM1 and COM2) it will be necessary to use an adapter to split the connector¹, as indicated at the following picture:



¹ - Check the Notes and Acronyms List at the beginning of this document

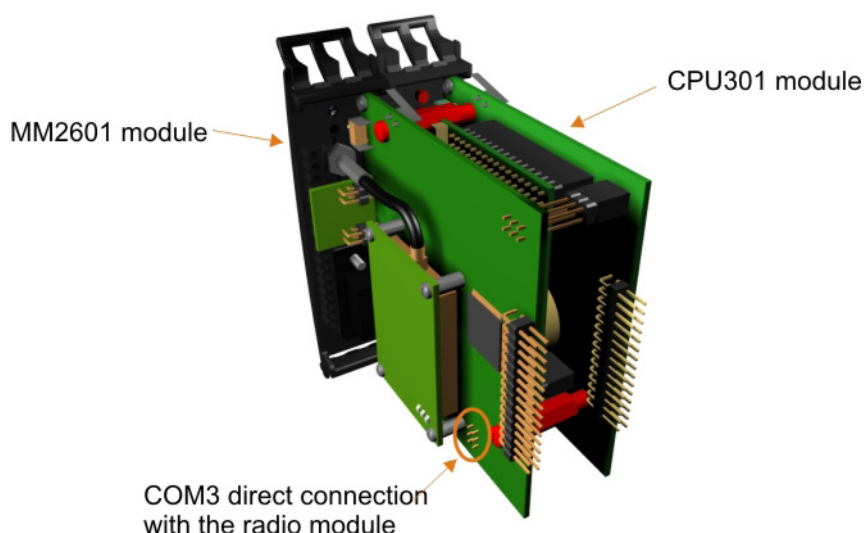
Signals arrangement (COM1 and COM2)

The module CPU301 has one DB9 connector¹ female, which can be split in two others connectors¹, providing COM1 and COM2.

DB9	RS232-C ¹	RS485 ¹	Direction	Description
1	GND ¹	GND ¹	-	0 Volt
2	RX1 ¹		Input	Receive Data COM1
3	TX1 ¹		Output	Transmit Data COM1
4		+DT	Input / Output	+Transmit/Receive Data
5	GND	GND ¹	-	0 Volt
6		-DT	Input / Output	-Transmit/Receive Data
7	TX2 ¹		Output	Transmit Data COM2
8	RX2 ¹		Input	Receive Data COM2
9	5Vdc	5Vdc	-	5 Volts

Serial (COM3)

CPU301 module provides at CN5 connector¹ a simple serial for modules communication



IMPORTANT: COM3 serial operates with voltage levels LVTTTL for direct connection with P7C¹ module. This way, do not use it with external equipments, because it may cause damages to the module.

Protocols

- SCP-HI¹
- MODBUS-RTU¹
- MODBUS-TCP¹
- ASCII¹ (interface for scanners, bar code readers, biometric readers, etc)

Transmission rate

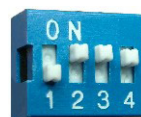
COM1, COM2 and COM3 channels can operate with baud rate from 1200 to 115200 Bauds



IMPORTANT: Do not turn on the device with the Dip Switch¹ (SW3) different from the configuration presented below. If turned on, it may cause damages to the communication interface of the equipment.

¹ - Check the Notes and Acronyms List at the beginning of this document

COM1 serial configuration

COM1 - RS232-C¹ SimpleCOM1 - RS485¹ without terminationCOM1 - RS485¹ with termination

IMPORTANT: RS232-C¹ serial simple has the signals: RX¹, TX¹ and GND¹.

When use RS485¹, the termination must be inserted at the equipments placed at the extremity of a RS485¹ network.

Global Parameters

Parameter	Value
Equipment communication identifier	1
PPE ¹ operation support	Deactivated

COM1 channel factory parameters

Parameter	Value
Baud rate	38400
Data bits ¹	8
Stop bits ¹	1
Parity	None
Protocol	SCP-HI ¹
Operation Mode	Slave
Transmission start delay	~2 ms
Driver	RS232-C ¹ (configuration defined at the hardware)
Flow control	Not available

COM2 channel factory parameters

Parameter	Value
Baud rate	38400
Data bits ¹	8
Stop bits ¹	1
Parity	None
Protocol	SCP-HI ¹
Operation Mode	Slave
Transmission start delay	0 ms
Driver	RS232-C ¹
Flow control	Not available

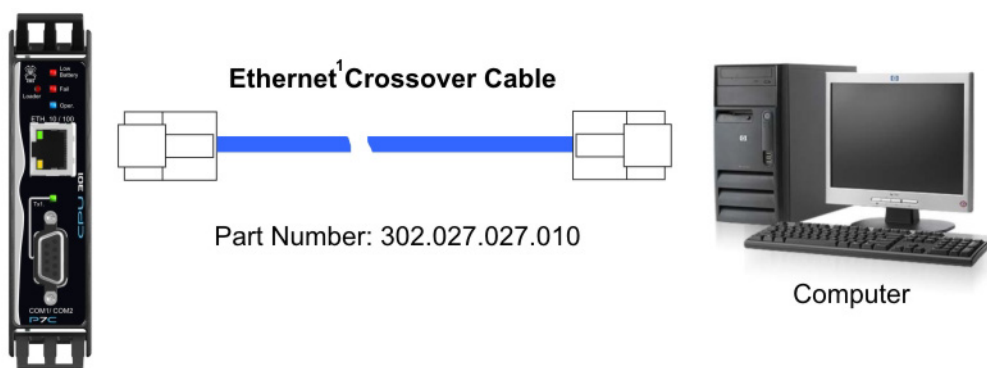
¹ - Check the Notes and Acronyms List at the beginning of this document

COM3 channel factory parameters

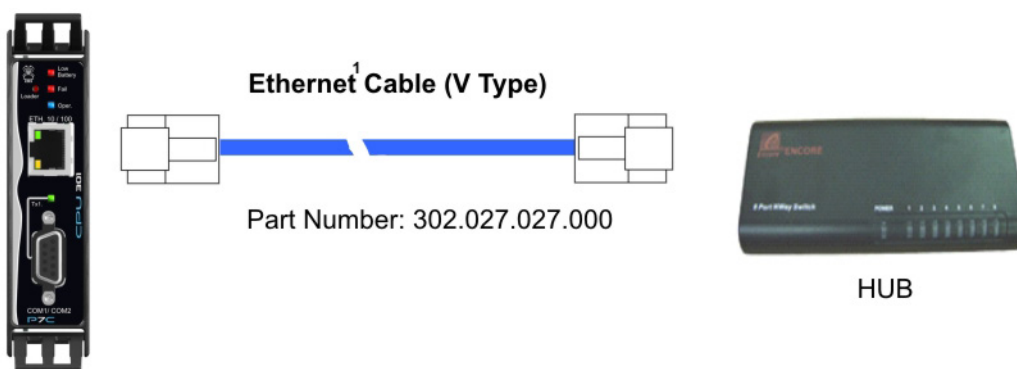
Parameter	Value
Baud rate	38400
Data bits ¹	8
Stop bits ¹	1
Parity	None
Protocol	SCP-HI ¹
Operation mode	Slave
Transmission start delay	0 ms
Driver	RS232-C ¹
Flow control	Not available

Ethernet Communication

Use example interconnecting the module CPU301 with a computer, using a Crossover cable.



Placing a CPU301 module on an Ethernet¹ network (HUB), using a common cable



Configuration

The module has an Ethernet¹ channel, able to operate with the following configurations:

Speed	Communication
10Mb	Full Duplex
10Mb	Half Duplex
100Mb	Full Duplex
100Mb	Half Duplex

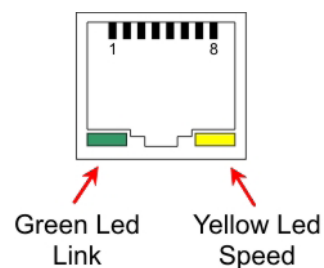
The configurations can be detected automatically by the module.

¹ - Check the Notes and Acronyms List at the beginning of this document

Ethernet¹ connector pin

The module CPU301 has a RJ45 connector¹ female, providing an standard Ethernet¹ channel.

RJ45	Ethernet ¹	Description
1	TD+ ¹	+Transmit Data
2	TD- ¹	-Transmit Data
3	RD+ ¹	+Receive Data
4	nu	not used
5	nu	not used
6	RD- ¹	-Receive Data
7	nu	not used
8	nu	not used



Protocols

- TCP-IP¹
 - UDP¹
 - UDP-Broadcast
- Transporting protocol SCP-HI¹ or MODBUS-TCP¹

Ethernet¹ channel factory parameters

Parameter	Value
Device name	P7C: NNNN (*)
Application protocol	SCP-HI ¹
Transport protocol	TCP/IP
Mode	Server
Accepts connection	any IP or Port
IP address	192.168.0.200
Port	2016
Gateway IP	192.168.0.1
Subnet mask	255.255.255.000
Connection timeout	200 ms
Connection trials number	8
Inactivity timeout	5 min.
Destination IP	127.0.0.1
Destination Port	1001
Destination Gateway IP	127.0.0.1
Destination Subnet mask	255.255.255.000

Note(*): NNNN => equipment Part Number

Loader

P7C¹ controller, from the loader¹ version 2.1.00 on, when operating with the loader¹ mode, provides communication resources through ethernet¹ ports and COM1 of the processor module (module present at the slot¹ 0). At COM1 serial channel, the loader¹ mode is configured to operate with the following parameters:

1 - Check the Notes and Acronyms List at the beginning of this document

Parameter	Value
Baud rate	38400
Data bits ¹	8
Stop bits ¹	1
Parity	None
Protocol	SCP-HI ¹
Driver	RS232-C ¹
Flow control	none

At COM3 serial channel, the loader¹ mode is configured to operate with the following parameters:

Parameter	Value
Baud rate	38400
Data bits ¹	8
Stop bits ¹	1
Parity	None
Protocol	SCP-HI ¹
Driver	RS232-C ¹
Flow control	none

At the Ethernet¹ channel, the loader¹ mode is configured to operate with the transport protocol UDP¹ and with the access port 65520. The IP address used at the communication depends on the following operational conditions:

2.1 Loader¹ activated remotely (through communication):

In this case, the IP address used will be the same programmed at the PLC¹, by the screen “Controller – Communication Setup” at the environment SPDSW¹.

2.2 Loader¹ activated locally (through the loader¹ button, at the processor module’s panel):

In this case, the IP address that will be used is defined by the switch SW2-1 placed at the processor module.

SW2-1	IP Address
OFF	Uses the IP address programmed at the PLC ¹ base (the same of the condition 2.1)
ON	Uses the PLC ¹ default IP address: 192.168.0.200

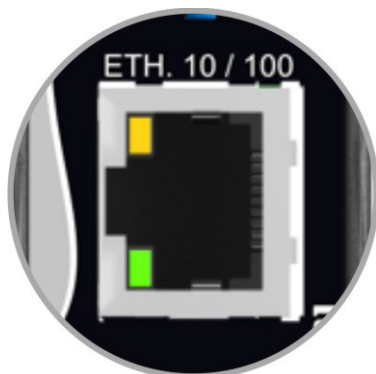
2.3 Invalid communication configuration base:

If the base that stores information about communication parameters is invalid (corrupted), the device will operate in loader¹ mode with the default IP address (192.168.0.200).

¹ - Check the Notes and Acronyms List at the beginning of this document

Process interface leds operation

Ethernet Channel



Led	Status	Condition
Yellow	On	100 Mbps connection
Yellow	Off	10 Mbps connection

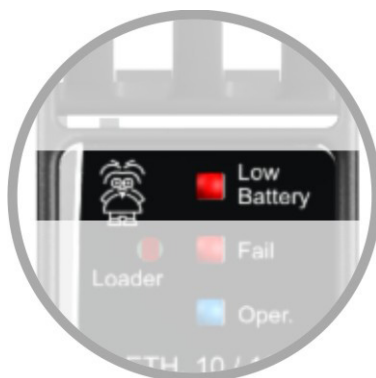
Led	Status	Condition
Green	On	Ethernet ¹ connection established
Green	Blinking	Exchanging data through Ethernet ¹ network
Green	Off	No Ethernet ¹ link detected

Serial Channel



Led	Status	Condition
TX1 ¹	On	Transmitting data to the remote device
TX1 ¹	Off	No communication proceeding or receiving data from the remote device

Battery

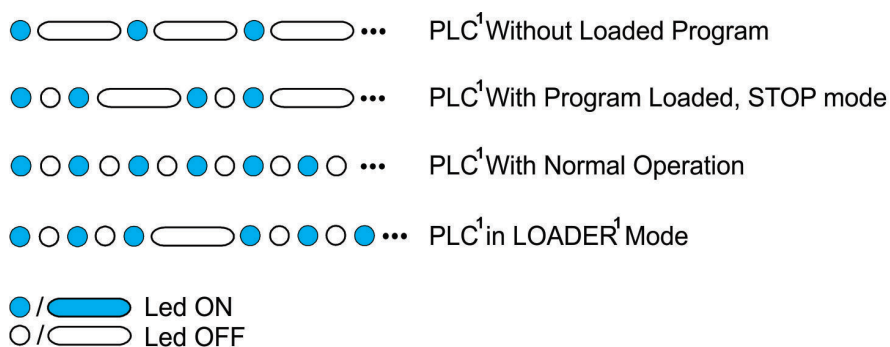


Led	Status	Condition
Low Battery	On	Low battery
Low Battery	Off	Battery OK

OPER



¹ - Check the Notes and Acronyms List at the beginning of this document



FAIL



1 blink



Fail at hardware initialization process

2 blinks



Fail at modules identification process

3 blinks



Hardware¹ fail

5 blinks



Invalid firmware or not authorized for the current device

6 blinks



Device configuration incompatible with the current program

7 blinks



Invalid application program

1 - Check the Notes and Acronyms List at the beginning of this document



Invalid "FORCE" base. The base that stores the status of forced inputs and outputs was corrupted.



Fail at COM1 communication channel initialization



Fail at COM2 communication channel initialization



Fail at COM3 communication channel initialization

● /  Led ON
 ○ /  Led OFF

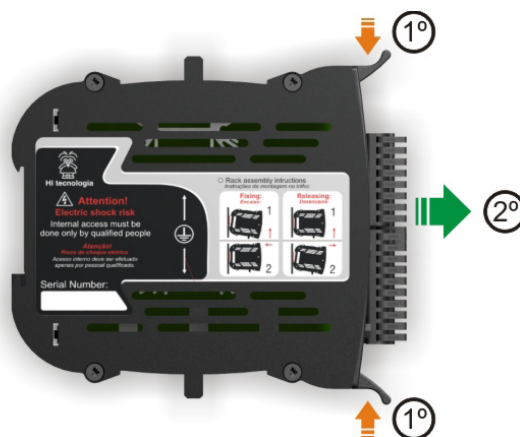
Module Addressing

The module CPU301 has not addressing configuration using hardware (strap¹/switch). It is provided automatically by the controller firmware when connected to the rack.

Removing the module from the rack

IMPORTANT: CPU301 modules CANNOT be replaced with the device turned on.

To remove the module from the main rack, push the two locks, one against the other, to unlock the plastic frontal. At this moment, pull them in order to remove them from the rack.



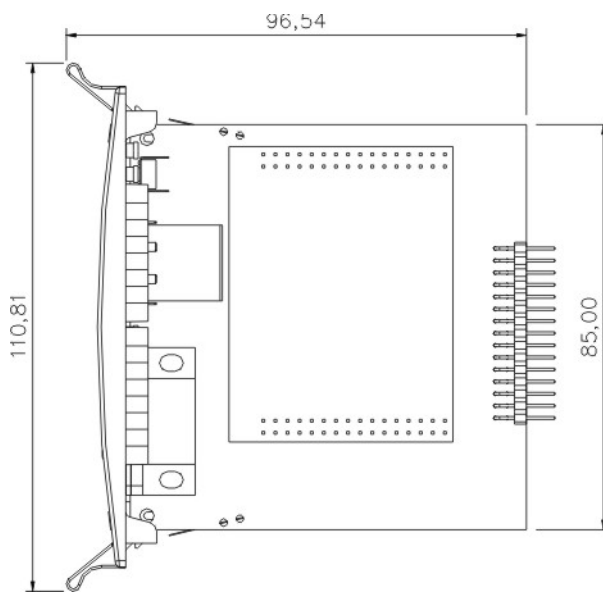
1 - Check the Notes and Acronyms List at the beginning of this document



1º - Press the locks, one against the other, using the two hands (it is not necessary to use a lot of force for that, just the enough to unlock. Each lock needs be moved at +/- 3mm (as indicated at the picture).

2º - With the locks pressed, pull them in order to disconnect the module from the rack (as indicated at the picture).

Dimensions (mm)



Product Part Number

Part Number	Identification
300.107.301.000	CPU module, RTC ¹ , Flash 512K, 16Mbits ¹ DFlash, NVRam 128K, 3 RS channels + Ethernet ¹

1 - Check the Notes and Acronyms List at the beggining of this document

15

PPU305 Technical Specifications

Presentation

PPU305 is a peripheral processor for P7C¹. Developed to operate as a co-processor of CPU301 module, it provides memory for application program, data memory, Data Flash¹, real time clock (RTC) and non volatile memory (NV-RAM) for information storage. It has an Ethernet¹ channel operating from 10/100Mbs, two communication serial channels at one frontal connector¹ DB9 and one internal channel (CBUS¹) used for data exchange with the module CPU301.

PPU305 is recognized for CPU301 as an exclusive module for data processing. This way, this module has not resources for direct access to the other I/O¹ modules of the equipment. All the access to the I/O¹ information of the PLC¹ are managed by CPU301, which must transmit them to the co-processor module PPU305.



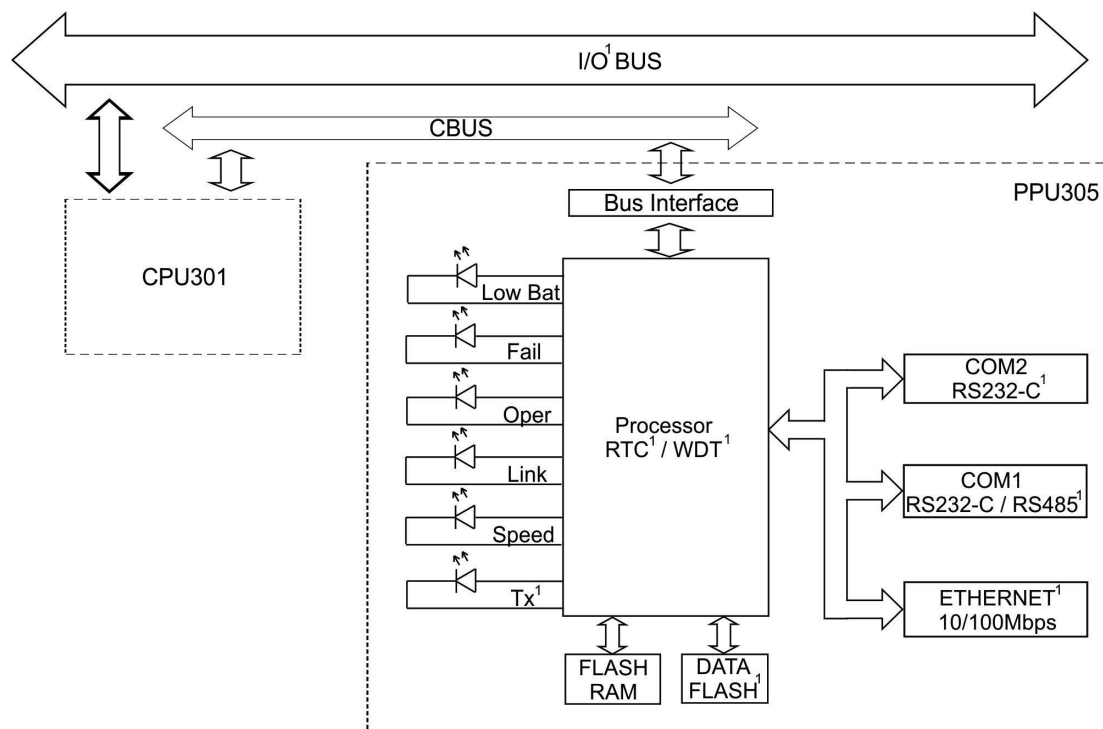
Technical Information

Power Supply	5 Vdc (supplied by main rack)
Consumption	0,8 W
Operation Temperature	0 to 60 °C
Storage Temperature	-25 °C to 80 °C
Humidity	≤90% without condensation
Module weight	0,06 Kg approximately
Dimensions	85 (W) x 83 (H) x 27 (L) mm
Clock	14.5476 MHz x 2
Flash Memory	512 Kbytes
WDT ¹	Yes
RTC ¹	Yes
Battery	Yes (RTC ¹ + NVRAM ¹)
Data Channel	16 Mbits ¹
COM1 Serial Channel	RS232-C ¹ / RS485 ¹ (configurable at the module)
COM2 Serial Channel	RS232-C ¹ Baudrate

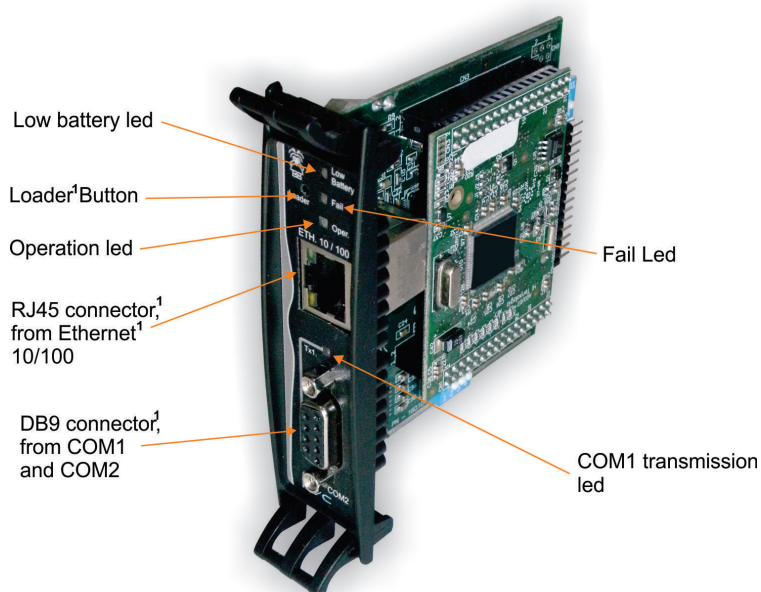
¹ - Consulte a lista de verbetes no início desse documento

Ethernet ¹ Channel	10 / 100 Mb (automatic)
CBUS ¹ channel	Access through data bus
Time/Logic Instructions	0,43µs

Block Diagram



Process Interface



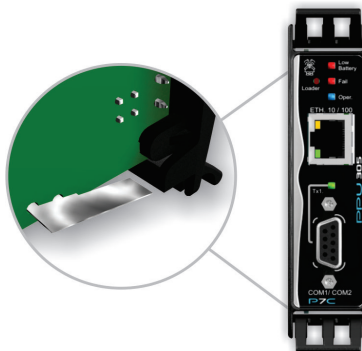
¹ - Consulte a lista de verbetes no início desse documento

Ground connector

There are two ground connectors at the side of the module, which are responsible for the contact with the main rack structure.



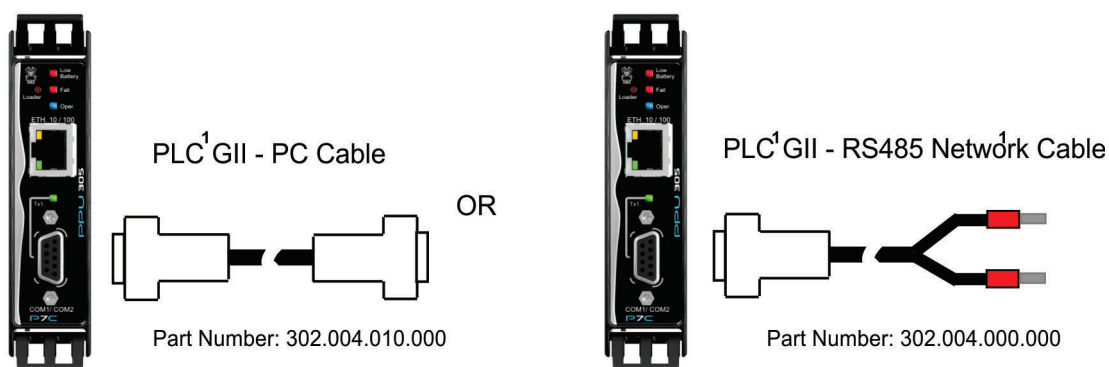
IMPORTANT: When handling the module, be careful to not hurt yourself with the ground connectors, because they have a sharp surface.



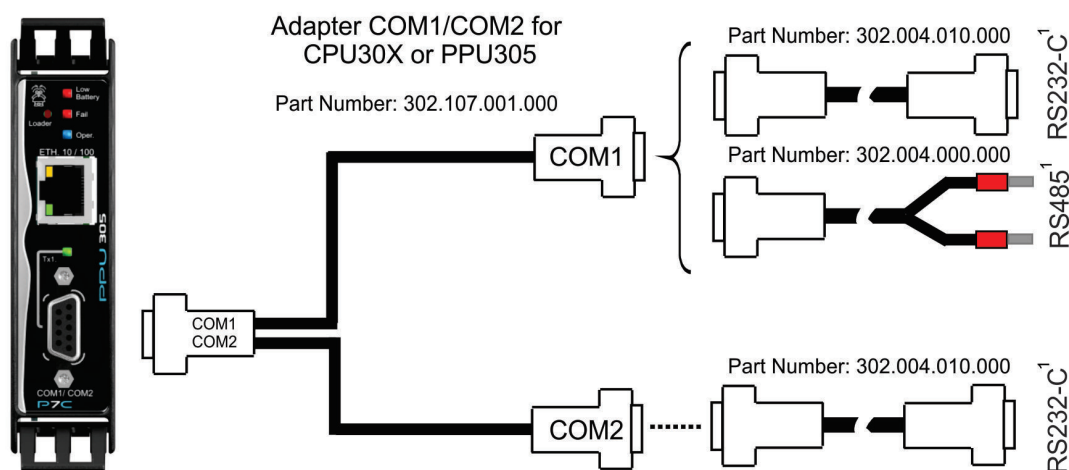
Serial Communication

Serial (COM1 and COM2)

Example of use that can be done with PPU305



For using the two serial (COM1 and COM2) it will be necessary to use an adapter to split the connector¹, as indicated at the following picture:



¹ - Check the Notes and Acronyms List at the beginning of this document

Signals arrangement (COM1 and COM2)

The module PPU305 has one DB9 connector¹ female, which can be split in two others connectors¹, providing COM1 and COM2.

DB9	RS232-C ¹	RS485 ¹	Direction	Description
1	GND ¹	GND ¹	-	0 Volt
2	RX1 ¹		Input	Receive Data COM1
3	TX1 ¹		Output	Transmit Data COM1
4		+DT	Input / Output	+Transmit/Receive Data
5	GND	GND ¹	-	0 Volt
6		-DT	Input / Output	-Transmit/Receive Data
7	TX2 ¹		Output	Transmit Data COM2
8	RX2 ¹		Input	Receive Data COM2
9	5Vdc	5Vdc	-	5 Volts

Protocols

- SCP-HI¹
- MODBUS-RTU¹
- MODBUS-TCP¹
- ASCII¹ (interface for scanners, bar code readers, biometric readers etc)

Transmission Rate

COM1 and COM2 can operate with Baud Rate from 1200 to 115200 Bauds.



IMPORTANT: Do not turn on the device with the Dip Switch¹ (SW3) different from the configuration presented below. If turned on, it may cause damages to the communication interface of the equipment.

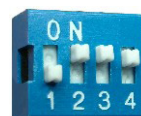
COM1 serial configuration



COM1 - RS232-C¹ simple



COM1 - RS485¹ without termination



COM1 - RS485¹ with termination



IMPORTANT: RS232-C¹ serial simple has the signals: RX¹, TX¹ and GND¹. When use RS485¹, the termination must be inserted at the equipments placed at the extremity of a RS485¹ network.

Global Parameters

Parameter	Value
Equipment communication identifier	1
PPE ¹ operation support	Deactivated

¹ - Check the Notes and Acronyms List at the beginning of this document

COM1 channel factory parameters

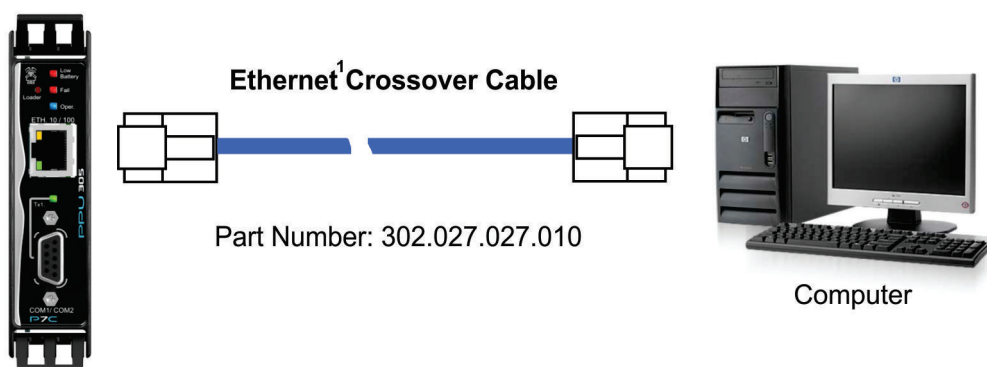
Parameter	Value
Baud rate	38400
Data bits ¹	8
Stop bits ¹	1
Parity	None
Protocol	SCP-HI ¹
Operation Mode	Slave
Transmission start delay	0 ms (Normally, when operating on RS485 ¹ , the delay of transmission start must be 2ms approximately)
Driver	RS232-C ¹ (configuration defined at the hardware)
Flow control	Not available


COM2 channel factory parameters

Parameter	Value
Baud rate	38400
Data bits ¹	8
Stop bits ¹	1
Parity	None
Protocol	SCP-HI ¹
Operation Mode	Slave
Transmission start delay	0 ms
Driver	RS232-C ¹
Flow control	Not available

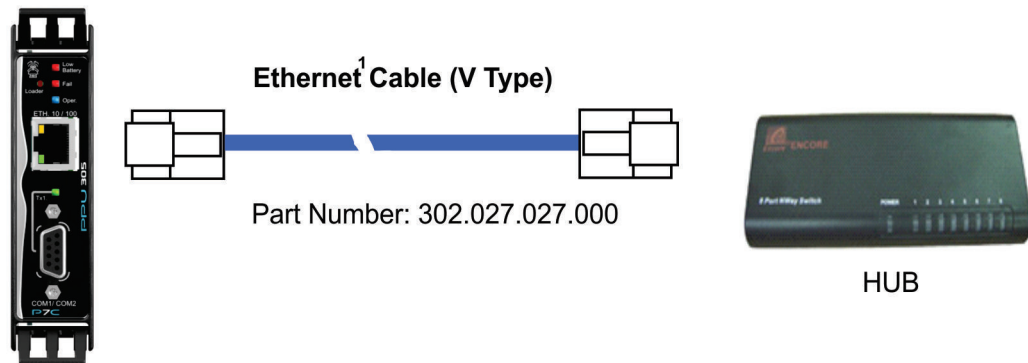
Ethernet Communication

Use example interconnecting the module CPU301 with a computer, using a Crossover cable.



¹ - Check the Notes and Acronyms List at the beginning of this document

Placing a PPU305 module on an Ethernet¹ network (HUB), using a common cable



Configuration

The module has an Ethernet¹ channel, able to operate with the following configurations:

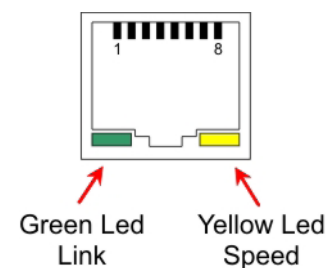
Speed	Communication
10Mb	Full Duplex
10Mb	Half Duplex
100Mb	Full Duplex
100Mb	Half Duplex

The configurations can be detected automatically by the module.

Ethernet¹ connector pin

The module PPU305 has a RJ45 connector¹ female, providing an standard Ethernet¹ channel.

RJ45	Ethernet ¹	Description
1	TD+ ¹	+Transmit Data
2	TD- ¹	-Transmit Data
3	RD+ ¹	+Receive Data
4	nu	not used
5	nu	not used
6	RD- ¹	-Receive Data
7	nu	not used
8	nu	not used



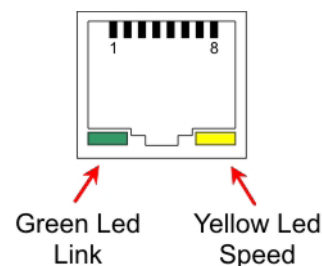
Protocols

- TCP-IP¹
 - UDP¹
 - UDP-Broadcast
- Transporting protocol SCP-HI¹ or MODBUS-TCP¹

¹ - Check the Notes and Acronyms List at the beginning of this document

Ethernet¹ channel factory parameters

Parameter	Value
Device name	P7C: NNNN (*)
Application protocol	SCP-HI ¹
Transport protocol	TCP/IP
Mode	Server
Accepts connection	any IP or Port
IP address	192.168.0.200
Port	2016
Gateway IP	192.168.0.1
Subnet mask	255.255.255.000
Connection timeout	200 ms
Connection trials number	8
Inactivity timeout	5 min.
Destination IP	127.0.0.1
Destination Port	1001
Destination Gateway IP	127.0.0.1
Destination Subnet mask	255.255.255.000



Note(*): NNNN => equipment Part Number

CBUS channel – Communication via Data Bus

PPU305 provides a communication channel (CBUS¹) which uses the internal data bus of P7C¹ controller for data exchange with CPU301 module. CBUS¹ channel of the module PPU305 can be used in two ways:

PPE communication via CPU301

CBUS¹ channel can be used via PPE¹ - [Extended Point-to-Point]. This functionality allows the access to PPU305 module via COM1, COM2, COM3 and Ethernet channels of CPU301 module.

Ladder-SCB communication via CPU301

CPU301 current ladder program can access the memories of PPU305 module, via CBUS¹ channel. For that, it is necessary to use the function of remote access to the program, which is available at the block [SCB].

Note: In both cases, to define the access address to PPU305 module, check the information at "Module Addressing" item.



CBUS¹ channel operates only with SCP-HI¹ protocol

¹ - Check the Notes and Acronyms List at the beginning of this document

Loader

The module PPU305 when operating on Loader¹ mode, provides communication resources through COM1, Ethernet¹ and CBUS¹ via PPE¹ - [Extended Point-to-Point].

At COM1 serial channel, loader¹ mode is configured to operate with the following parameters:

Parameter	Value
Baud rate	38400
Data bits ¹	8
Stop bits ¹	1
Parity	None
Protocol	SCP-HI ¹
Driver	RS232-C ¹
Flow control	none

At the Ethernet¹ channel, the loader¹ mode is configured to operate with the transport protocol UDP¹ and with the access port 65520. The IP address used at the communication depends on the following operational conditions:

2.1 Loader¹ activated remotely (through communication):

In this case, the IP address used will be the same programmed at the PLC¹, by the screen “Controller – Communication Setup” at the environment SPDSW¹.

2.2 Loader¹ activated locally (through the loader¹ button, at the processor module’s panel):

In this case, the IP address that will be used is defined by the switch SW2-1 placed at the processor module.

SW2-1	IP Address
OFF	Uses the IP address programmed at the PLC ¹ base (the same of the condition 2.1)
ON	Uses the PLC ¹ default IP address: 192.168.0.200

2.3 Invalid communication configuration base:

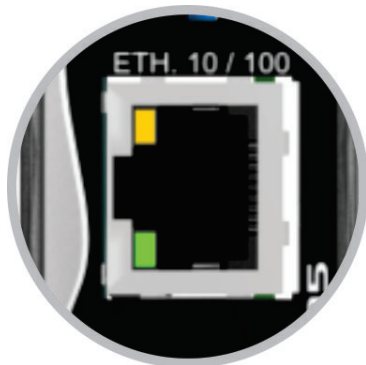
If the base that stores information about communication parameters is invalid (corrupted), the device will operate in loader1 mode with the default IP address (192.168.0.200).

CBUS¹ channel has support for use on loader mode, allowing the user to load the PPU305 firmware via CPU301, using PPE¹ – [Extended Point to Point].

¹ - Check the Notes and Acronyms List at the beginning of this document

Process interface leds operation

Ethernet Channel



Led	Status	Condition
Yellow	On	100 Mbps connection
Yellow	Off	10 Mbps connection

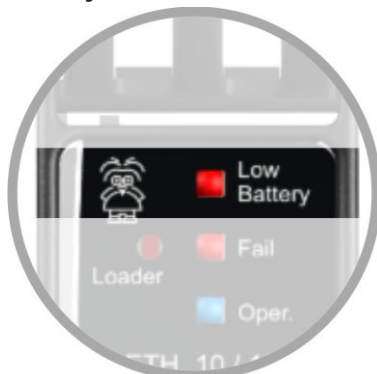
Led	Status	Condition
Green	On	Ethernet ¹ connection established
Green	Blinking	Exchanging data through Ethernet ¹ network
Green	Off	No Ethernet ¹ link detected

Serial Channel



Led	Status	Condition
TX1 ¹	On	Transmitting data to the remote device
TX1 ¹	Off	No communication proceeding or receiving data from the remote device

Battery

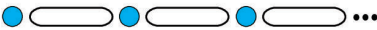









Led	Status	Condition
Low Battery	On	Low battery
Low Battery	Off	Battery OK

OPER



¹ - Check the Notes and Acronyms List at the beginning of this document

-  PLC¹ Without Loaded Program
-  PLC¹ With Program Loaded, STOP mode
-  PLC¹ With Normal Operation
-  PLC¹ in LOADER¹ Mode
-  /  Led ON
 /  Led OFF

FAIL



1 blink



Fail at hardware initialization process

5 blinks



Invalid firmware or not authorized for the current device

6 blinks



Device configuration incompatible with the current program

7 blinks



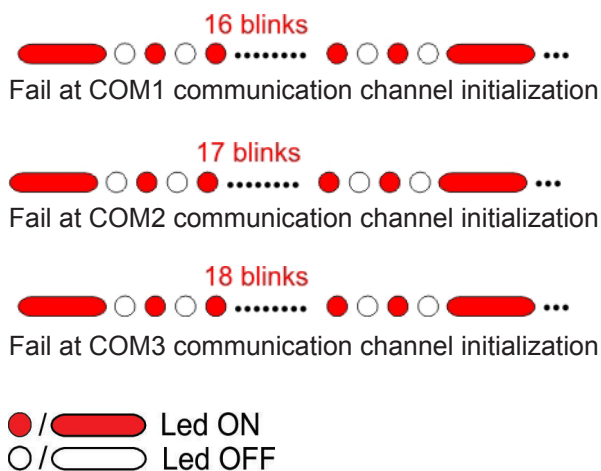
Invalid application program

8 blinks



Invalid "FORCE" base. The base that stores the status of forced inputs and outputs was corrupted

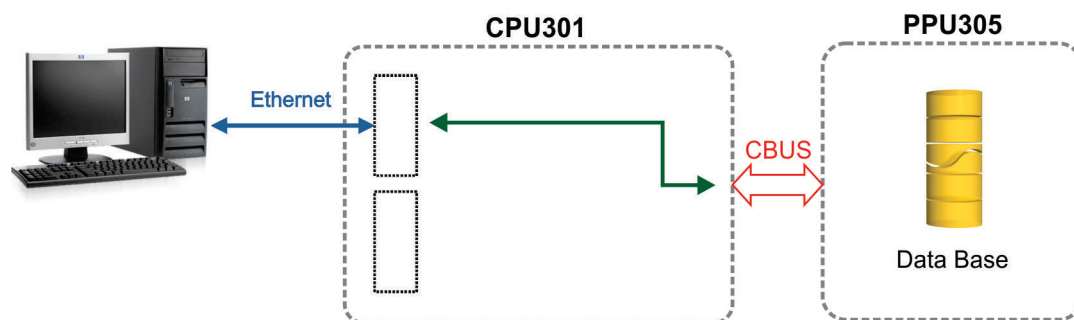
1 - Check the Notes and Acronyms List at the beginning of this document



Access to PPU305 module via CPU301

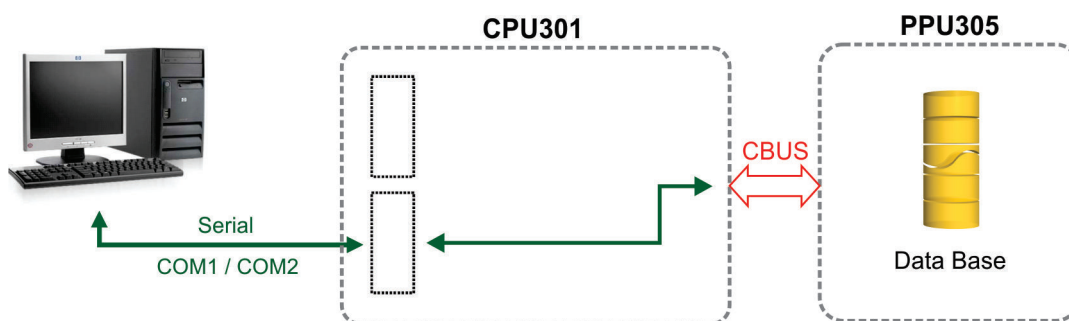
The access to PPU305 module can be done through the communication channels of CPU301 module using packages redirecting via PPE¹ – [Extended Point-to-Point]. For that it is necessary to define the association between the channels, as indicated below:

Access via CPU301 Ethernet channel



Note: PPE¹ association – [Ethernet¹ <=> CBUS¹]

Access via CPU301 serial channel



Note: PPE¹ association – [COM1 <=> CBUS¹] or [COM2 <=> CBUS¹]

1 - Check the Notes and Acronyms List at the beginning of this document

Module addressing

PPU305 addressing mode depends on the access type that will be executed.

Address for local access

When the access to PPU305 is executed locally via COM1, COM2 and Ethernet ports of the module, the access address is defined on "Controller ID" parameter, identically to CPU301. This way, the address is configurable and it can assume values from 1 to 255.

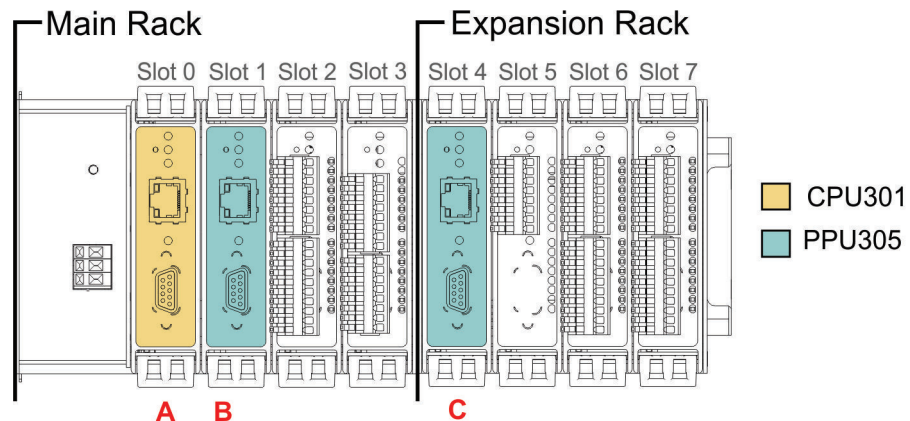
Address for PPE access – [Extended Point-to-Point]

When the access to PPU305 is executed using PPE resource via CPU301 module, the address of the module is a non configurable parameter, but automatically composed by:

PPU305 address = (CPU301 address, "Controller ID" + Position of the module at the rack [SLOT]).

Example:

PPU305 address = (CPU301 address, "Controller ID" + Position of the module at the rack [SLOT]).
 Check the context below, where there's a CPU module (A) and two PPU305 modules (B and C).



Address PPU305 (B) = 2

(Main CPU address = 1 + Position of the module at the rack [SLOT = 1]).

Address PPU305 (C) = 5

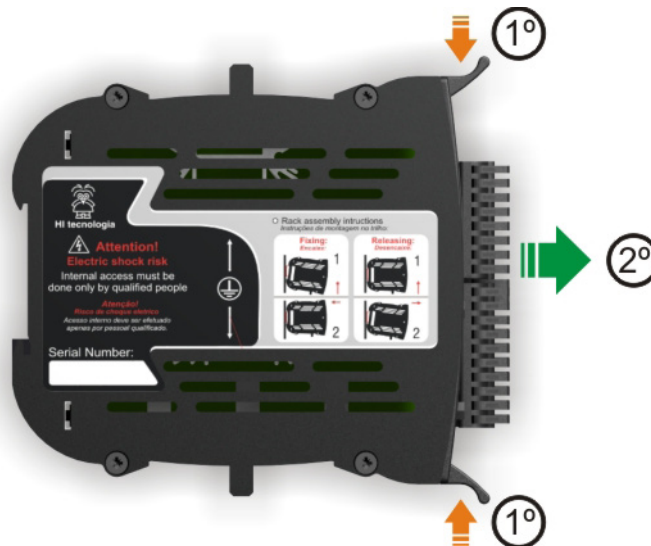
(Main CPU address = 1 + Position of the module at the rack [SLOT = 4]).

Removing the module from the rack



PPU305 modules CAN be replaced with the device turned on (Hot Swap¹).

To remove the module from the main rack, push the two locks, one against the other, to unlock the plastic frontal. At this moment, pull them in order to remove them from the rack.



1º - Press the locks, one against the other, using the two hands (it is not necessary to use a lot of force for that, just the enough to unlock. Each lock needs be moved at +/- 3mm (as indicated at the picture).

2º - With the locks pressed, pull them in order to disconnect the module from the rack (as indicated at the picture).

PPU305 utilisation examples

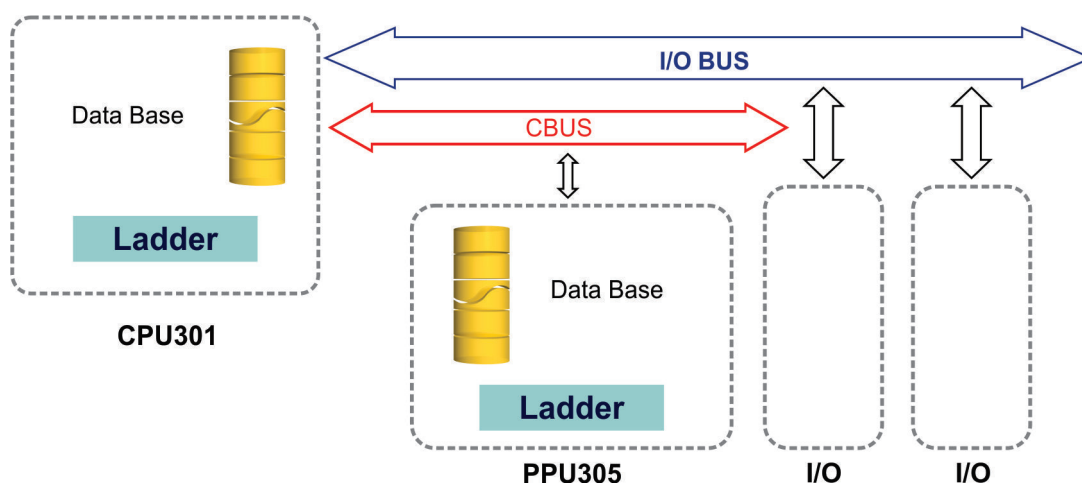
In cases in where it is necessary to use a great quantity of algorithms and process control functions, the performance is always an important point. In this context, with the use of only one control CPU, the processing necessary for the execution of complex tasks will be higher and it can interfere directly on the control performance, without considering that the complexity level of the ladder program tends to increase, because it must englobe other functions, like the management of I/O¹ points

With the use of PPU305 module, the “hard” processing can be shared with the co-processor modules, letting for the CPU module the management and control of the other tasks, as the treatment of data generated by co-processors, I/O¹ points updates and others.

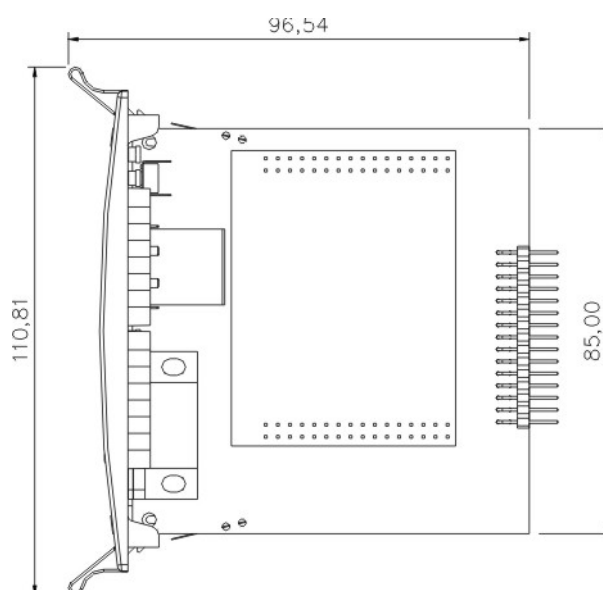
The next block diagram presents an overview of the scenery described above, where via the CBUS¹ channel, the current ladder program of CPU301 module accesses the data base of PPU305 module, and through the data bus I/O BUS, controls I/O¹ modules.

¹ - Check the Notes and Acronysms List at the beggining of this document

Data management via CPU ladder program



Dimensions (mm)



Product Part Number

Part Number	Identification
300.107.305.000	CPU module, RTC ¹ , Flash 512K, 16Mbits ¹ DFlash, NVRam 128K, 3 RS channels + Ethernet ¹ + CBUS ¹

¹ - Check the Notes and Acronyms List at the beginning of this document